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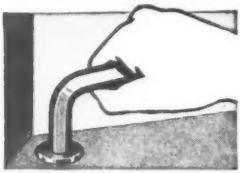

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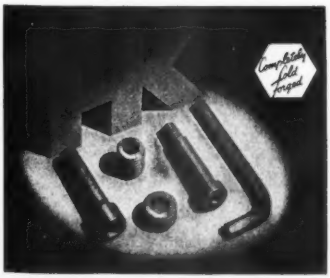

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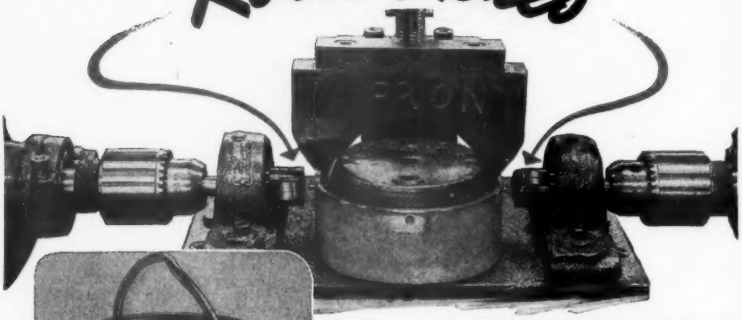

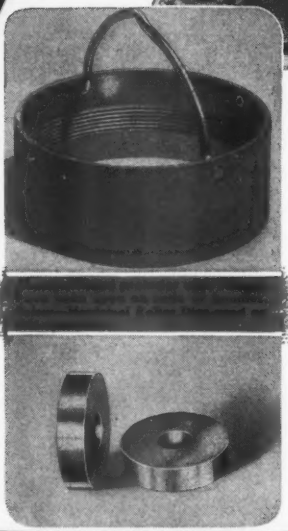

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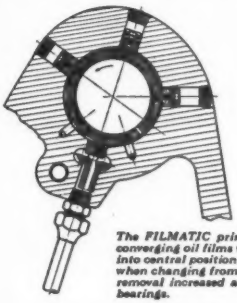

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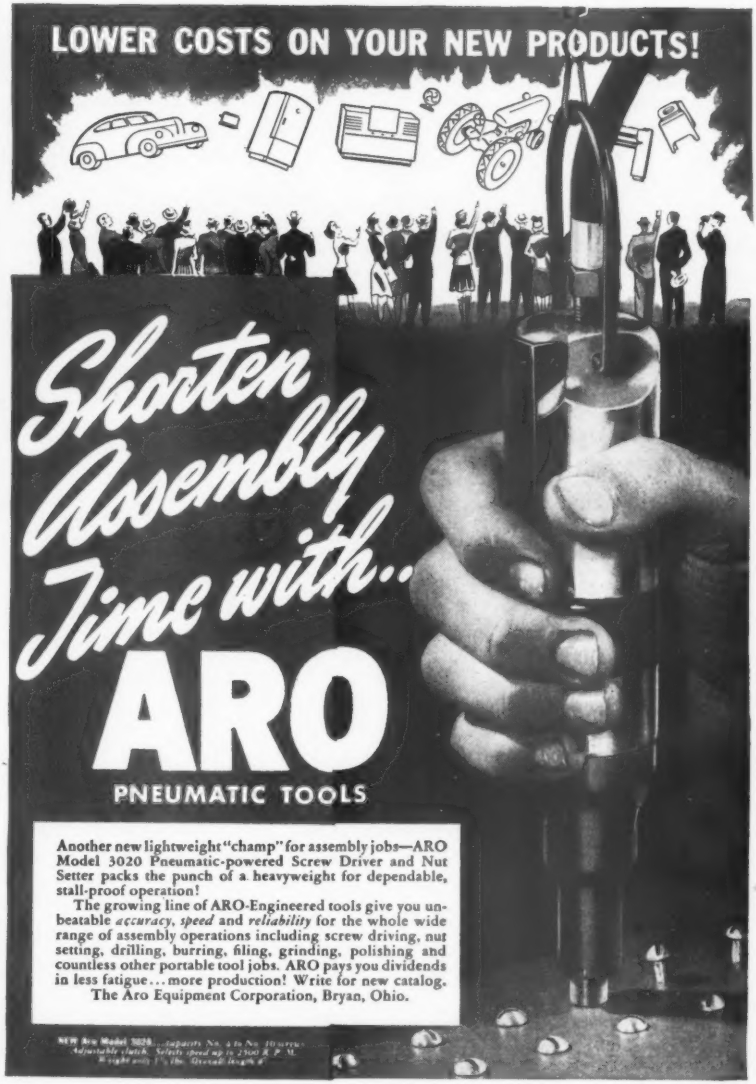
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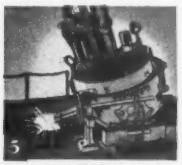

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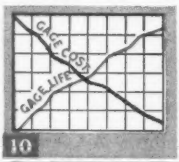

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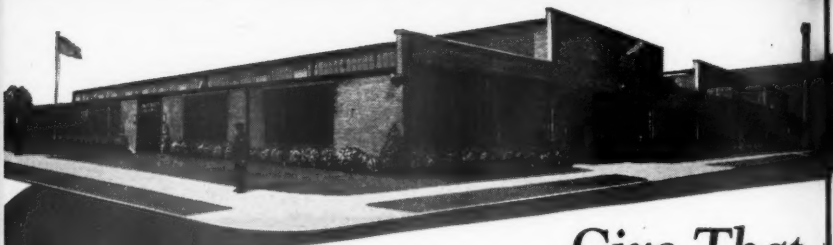

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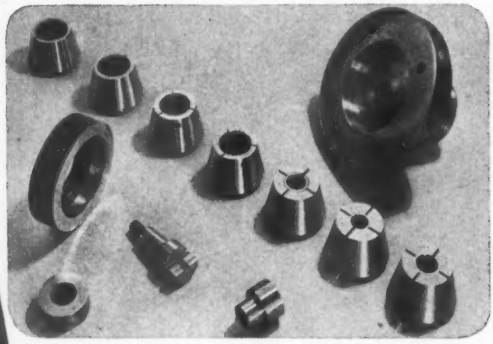

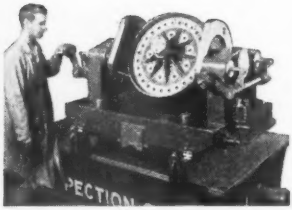

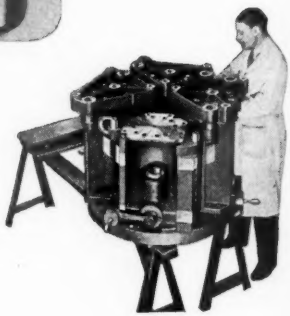

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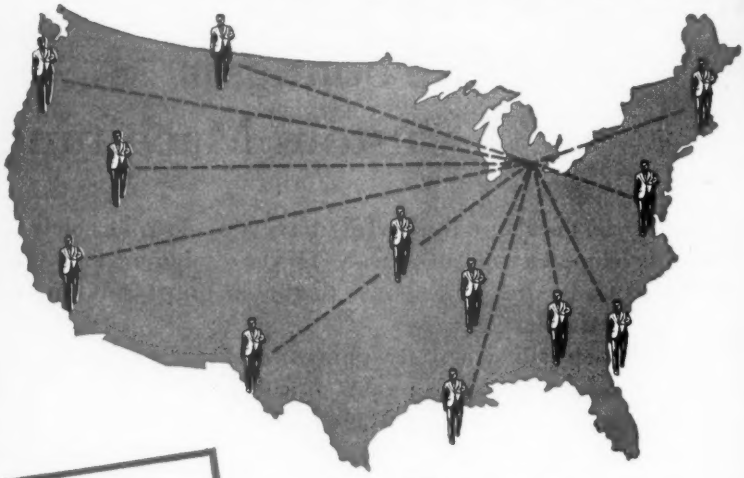

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PRODUCTION DATA

Material—Machine Steel.
Operation—Duplicating Die Molds for Plastic Handles.
Speed—Roughing, 500 r.p.m.
Finishing, 1100 r.p.m.
Time—25 Hours per Mold, Floor-to-Floor.
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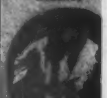

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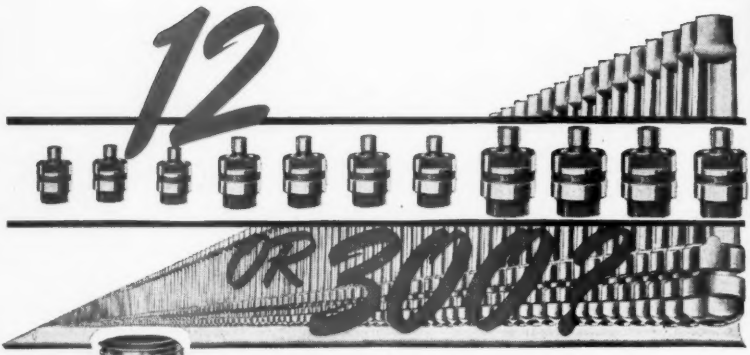

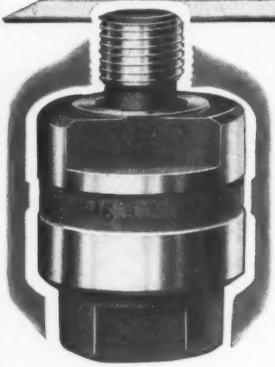

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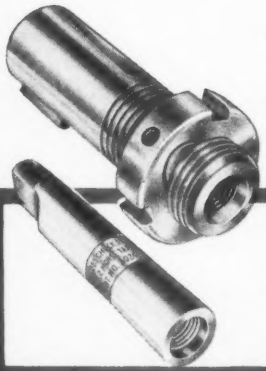
1. Ability to handle an unusually wide range of drill sizes.
2. Extreme simplicity which features the Rubber-Flex Collet of one-piece construction ground as a unit after molding.
3. Ever-parallel jaw gripping surfaces that provide a tremendous hold on drill or reamer shanks.

The chuck socket receives the flatted tang of the drill and will take all drills having the same flat size. *On most applications,* because of the tenacious grip of the Rubber-Flex Collet, *standard drills can be used without danger of slippage.*



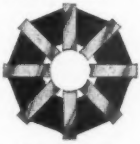
ADJUSTABLE ADAPTERS AND ARBORS

Jacobs Production Chucks have a male thread for mounting directly on the machine spindle or attaching to Morse Taper Arbors or Adjustable Adapters.

The Adjustable Adapter Assembly provides a quick, convenient means of compensating for variations in drill length. Adapters and Arbors are available in all popular sizes.

12 *Jacobs* PRODUCTION CHUCKS AND 3 ARBORS COVER MORE THAN 300 SINGLE PURPOSE CHUCK APPLICATIONS!

Inside faces of jaws comprise bore of collet.



At maximum capacity.

On large shanks, jaw-bites are always parallel.

featuring the Rubber-Flex Collet

"THE COLLET WITH A RANGE"

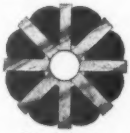
See how the new design and construction principle of the Rubber-Flex Collet can bring new efficiency and economy to your machine operations. The hardened alloy steel jaws are uniformly spaced and molded into an integral unit with a special compound of oil-resisting Neoprene.

The action of the rubber is displacement, rather than compression. Under pressure it is displaced from its original shape, the volume of rubber between the jaws being the same as before force was applied. When the force is removed, it springs back to original shape, positively opening the jaws.

The jaws of the collet grip their full length and are always parallel throughout their entire range. This outstanding feature provides maximum gripping power and assures consistent, sustained accuracy.

Write for special Bulletin P9 today. The Jacobs Manufacturing Company, Hartford 2, Connecticut.

Springing is taken care of by the Neoprene.



At minimum capacity.

On small shanks, jaw-bites are always parallel.

Jacobs Chucks

THE NATIONAL STANDARD FOR POST WAR PRODUCTION

The NORTON 4" TYPE C GRINDER

Particularly Suited for —
- Heating and Air Conditioning Parts
- Refrigeration Parts
- Small Motor Shafts
- Instrument Parts
- Small Valves
- Pump Parts
- Gun Parts
- Gages

STANDARD EQUIPMENT
Automatic Work Start and Stop, Automatic Coolant Control, Two Speed Hand Table Traverse, Work Jogging, Dwell Control, Picker Feed At Reversals, Interlock between Hydraulic and Hand Table Traverse

OPTIONAL EQUIPMENT
Combination Wheel Spindle Reciprocation and Shoulder Grinding Attachment

Other Specials on Request

NORTON precision and dependability is made available for the grinding of small parts in the Norton 4" Type C.

Still the "baby" of the line, it has nevertheless proven unmistakably by its performance in the field that it is a worthy addition to the line of "Nortons" that form the backbone of so many of the nation's high production grinding lines.

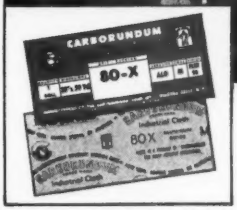
Compact — efficient — and sturdy — it is the machine for your small parts jobs.

NORTON COMPANY, WORCESTER 6, MASS.

M-517

NORTON GRINDERS

HERE'S HOW TO GET THE RIGHT COATED ABRASIVE — everytime!



NOW the Coated Abrasives by "CARBORUNDUM" have the specifications clearly and simply marked on *both* the labels and backing materials! Thus, when the material is in use in the shop, you can tell what to requisition from the stockroom. And the stockroom, from either labels or backing material can tell at a glance what to ask the purchasing department to reorder. A glance at the picture of label and backing will tell you how this new marking system for Coated Abrasives by "CARBORUNDUM" makes it easy to identify, specify and order this popular line of coated abrasive products. The Carborundum Company, Niagara Falls, New York.

THERE IS A PRODUCT BY

CARBORUNDUM

TRADE MARK

FOR EVERY ABRASIVE APPLICATION

("CARBORUNDUM" is a registered trade mark of and indicates manufacture by The Carborundum Company)

WINS ON UNIFORMITY

Recently one of the largest steel companies in the world (name on request) switched to DoALL Band Saws, only after making 29 very minute and concrete, comparative tests.

DoALL won on the basis of UNIFORMITY. Some saws cut faster on the first coil, then fell behind on the second or third, but DoALLs were most uniform, coil after coil, job after job.

A perfect saw for every material

You name it—there's a best DoALL saw for it, whether the job is external or internal cutting, straight line, contour shaping or 3-dimensional work.

DoALL Saws are available in two general styles, Precision and Buttress. Packed in 100-ft. coils in safety dispensing boxes or cut and welded to fit any band sawing or cut-off machine.

REQUIRE NO RESHARPENING

DoALL saw blades are so tough and give so much additional service that it is economical to run them until worn out and then replace with new blades.

PRECISION SAWS

Recommended for use on all ferrous metals. Come in widths from 3/32" to 1", pitches 6 to 32.

BUTTRESS SAWS

The finest for non-ferrous metals, aluminum, magnesium, plastics, laminates, ceramics, wood, etc. Widths 1/4" to 1". Pitches 2 to 6.

Write or phone for booklet illustrating and listing all DoALL Saws

INDUSTRY'S NEW SET OF TOOLS

Baltimore	SA 5770	Dayton	HE 2738	Kansas City	HA 5957	Milwaukee	BR 5950	New York	BR 4-1514	Philadelphia	BAL 5850
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Boston	ASP 6660	Detroit	TE 2-3000								
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The DoALL Company Des Plaines Illinois

Telephone Your "DoALL" Sales and Service Store

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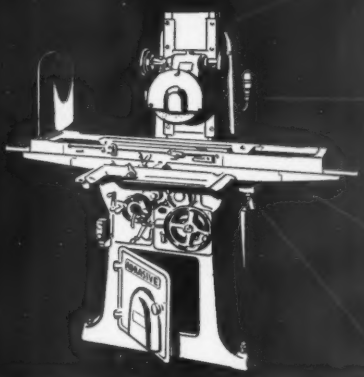
An Outstanding Machine FOR Outstanding Performance



ABRASIVE 3B SURFACE GRINDER

Wherever accuracy, smooth finish and high production are essential, the 3-B gives outstanding service. Simple in design and with wholly automatic feeds . . . both longitudinal and transverse . . . this reliable ABRASIVE Grinder meets exacting production schedules year after year.

Capacity: Longitudinal, 24" with total movement of 26"; Transverse, 8" with total movement of 8½"; Vertical, 12" with total movement of 12½".

AVAILABLE FOR IMMEDIATE DELIVERY - Send for Descriptive Bulletin

ABRASIVE MACHINE TOOL CO., EAST PROVIDENCE 14, R. I.

Dealers in Principal Cities

ABRASIVE

ACCURACY BOOSTS PRODUCTION

ONE-PIECE BED

One-piece casting rigidly designed with heavy ribs inside base, weighs approximately 1600 lbs. Assures perfect alignment and extreme accuracy.

MASSIVELY CONSTRUCTED HEAD — Suspended on ball thrust bearing and accurately cut, acme threaded screw. Wheelhead weighs approximately 180 lbs. Fitted with interchangeable, heavy spindle cartridge. Left elevating handwheel is graduated to .0001". Right hand wheel gives 3 to 1 acceleration for movement of the Wheelhead.

HEAVY-DUTY TABLE

Well ribbed for maximum rigidity, weighs approximately 250 lbs. Has three ⅝" ground tee slots in working surface, and permits use of large fixtures. 8" width can be ground with ½" wheel. Ways do not uncover even on maximum length of stroke.

RIGID SADDLE

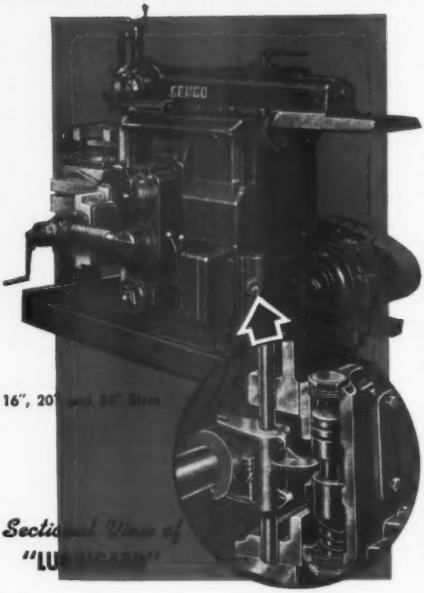
Deep box type construction assures stiffness; has large, 2 qt. capacity, oil reservoir. Bottom ways, of Vee type, are of sufficient length to prevent uncovering bed in either direction.

We will gladly supply information on ABRASIVE Machines on the Government Machine Tool Surplus List . . . just send us the machine serial numbers. Attachments, accessories and repair parts can also be provided.

Only GEMCO Shapers Give You "LUBRIGARD"

This Exclusive SAFETY Device Insures Proper Lubrication, Automatically

– AND Safeguards Operator, Machine and Work Piece!



16", 20" and 24" Sizes

Sectional View of "LUBRIGARD"

Oil under pressure forces piston down, permitting projection on clutch control lever shaft to clear recess in piston, thereby allowing control lever to move into starting position.

The function of "LUBRIGARD" is to automatically prevent the ram of the machine from being started:

1. **In case oil supply in reservoir is insufficient;**
2. **Should pressure in the system be below the minimum required;**
3. **Should a leak or failure of the oil pressure system occur;**
4. **Should the filter become clogged;**
5. **Should the drive pulley rotation be incorrect.**

In addition, "LUBRIGARD" will prevent the clutch control lever from being engaged while the drive pulley is at rest. Therefore, should the motor be started, the ram will not move unexpectedly. This prevents injury to the operator, or damage to the machine or work piece.

"LUBRIGARD" assures long, satisfactory shaper performance, because of adequate, automatically-controlled lubrication of all bearing surfaces. *It increases the Precision Life!*

GEMCO

Multi-Purpose SHAPERS

MANUFACTURERS OF PRECISION MACHINERY SINCE 1917

GENERAL ENGINEERING & MFG. CO.

SAINT LOUIS 4, MISSOURI

Write Today for Bulletin GC-12D

HELLER NUCUTS
CUT AND SMOOTH
ON EVERY STROKE

NUCUT *filing*
does with one file
what ordinarily takes two

This double-filing action is an outstanding characteristic of the Heller NUCUT File. The result of the patented Heller "Wavy Teeth" design, it is recognized as the most significant improvement in modern file manufacture!

Heller "two-in-one" filing is developed around two sets of *scientifically* positioned teeth, one coarse, the other fine. With every stroke of the file, the coarse teeth take deep, clean, uniform cuts while the fine teeth level the surface smooth—just as though TWO files were working instead of ONE!

It is only natural then that wherever files are used—in the die shop, in the toolroom, in the machine shop—the Heller NUCUT "Wavy Teeth" File can be found helping to do that *particular* filing job *quicker, easier* and *smoother!*

Awarded to the Newcomerstown, Ohio Plant

HELLER BROTHERS COMPANY
America's Oldest File Manufacturers — Good Tools Since 1836
Newark 4, New Jersey • Newcomerstown, Ohio

ASK FOR THE FILE WITH THE "WHITE TANG"

HELLER **NUCUT** WAVY-TEETH FILES

EXPERIENCED DESIGNERS

SEASONED MECHANICS

MODERN PRODUCTION FACILITIES

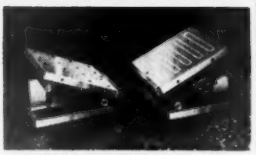
TO MEET YOUR TOOLING NEEDS

Promptly and Efficiently

A portion of the Robbins engineering department.

A view down the main aisle of the Robbins shop. Note the orderly arrangement of the machines and the excellent lighting. Such an atmosphere helps Robbins mechanics to do better work more efficiently.

WHEN you need tools, gages, fixtures and special machinery either designed to suit your requirements or built to conform exactly to your blue prints, get a quotation from Robbins Engineering Company. Robbins Engineers have a varied experience in designing special equipment of all types. Robbins workers are good mechanics used to working to close tolerances. Many of them have been building fine production equipment for Robbins for more than 15 years. Robbins equipment is complete, the best and most modern to be had. This combination of the best equipment plus the skill to use it to its fullest advantage assures you of the finest quality of workmanship at the lowest possible cost. Next time have Robbins figure the job. You'll get Robbins' high quality without a price premium.



MANUFACTURERS OF THE UNIV-ANGLE, MAGNA-SINE AND ROBBINS SINE PLATE

In a separate department of the plant, Robbins manufactures these well-known products used for extremely accurate angular grinding, jig boring and inspection. Full information on request.

Robbins ENGINEERING COMPANY

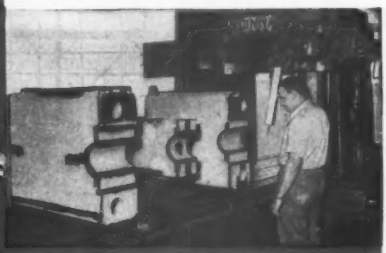
318 MIDLAND AVE. • DETROIT 8, MICHIGAN

MODERN PRECISION WELDMENTS

FOR HEAVY STUFF"!

Modern large-scale precision weldments, made possible by advanced techniques developed during the war, are already proving highly advantageous in the heavy machinery industries. Special weldments, designed, fabricated and finished at Warren City, are replacing heavy steel castings in many important applications. In the Bliss Enclosed Press shown here, the crowns, beds and slides are now Warren City weldments, saving weight and increasing strength. Precision is assured by accurate normalizing, stress-relieving, machining and testing, with the finest modern scientific methods and equipment.

Finishing a precision-tested Bliss press crown, fabricated from welded steel plates at Warren City



WELDMENTS SAVE WEIGHT, ADD STRENGTH, IN FAMOUS BLISS INDUSTRIAL PRESSES

Eliminate Pattern Costs and Casting Defects!

IF YOUR PROBLEM involves the use of heavy steel castings or weldments, be sure you don't overlook the most unusual facilities and know-how available to you at Warren City Manufacturing Company. Located in the very heart of the Cleveland-Pittsburgh industrial area, our huge seven-million-dollar plant contains every modern device for the handling, cutting, fabricating, welding, normalizing, machining, assembling and testing of heavy machinery, parts, equipment. Whether, as in the case of the E. W. Bliss Company, your situation calls for redesigning your present steel castings in order to enjoy the advantages of modern precision weldments, or whether your need is simply for extra production capacity without increasing the size of your plant, our engineering staff will offer you their recommendations entirely without obligation. Write today for our illustrated brochure, with complete listing of our facilities.

WARREN CITY MANUFACTURING COMPANY★★★

DEPARTMENT G • WARREN, OHIO

Wholly Owned Subsidiary of GRAHAM-PAIGE MOTORS CORPORATION

New Keyless Chuck

does its own drill tightening

THE TURNER CHUCK *Saves Time!*

Hardened bearing steel roller jaws grip the drill without chewing or scoring.

Grip is automatically and progressively strengthened with increased load pressure

Ball bearings increase life.

Absolutely KEYLESS. No more chewed drill shanks. No more time wasted looking for keys.

The Turner Chuck is self-energizing. Tightens itself by the action of the drill.

Drill will not slip in use. Chuck is automatically self-centering and drill runs true without hand adjustments.

Sold Exclusively By:
Don L. Fox
Sales Co.
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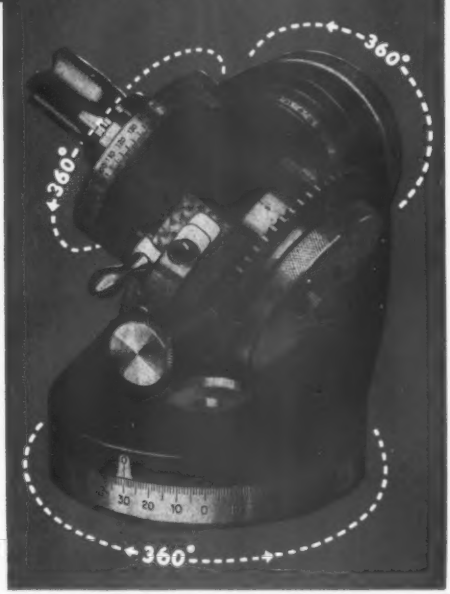
TURNER BROTHERS

TURNER GAUGE GRINDING COMPANY
HILTON, DRAYTON & CORTEZ • FERNDALE 20, MICHIGAN

Cut Tool Maintenance . . . Reduce Manufacturing Costs with The CLEVELAND UNIVERSAL INDEXING HEAD

Now you can regrind your tools . . . in your own shop . . . on any surface grinder . . . in a fraction of the time usually required. Maintaining your tools in tip-top shape, with factory precision regrinds, will help reduce your manufacturing costs.

360° graduations in three planes enable you to regrind or sharpen your tools with any desired angle or cutting edge. Automatic Indexing, provided with a vernier adjustment, permits the re-establishment of concentricity on tools where one or more cutting edges have been unduly worn or damaged.



Only the Cleveland Universal Indexing Head provides three plane 360° settings *plus* compensating automatic indexing. Now available from stock at a *new reduced price.*

New Bulletin Available

Write today on your business letterhead for copy of the new bulletin on the Cleveland Universal Indexing Head. See how you too can reduce your tool maintenance costs. There's no obligation.

GRINDERS AND FIXTURES, INC.

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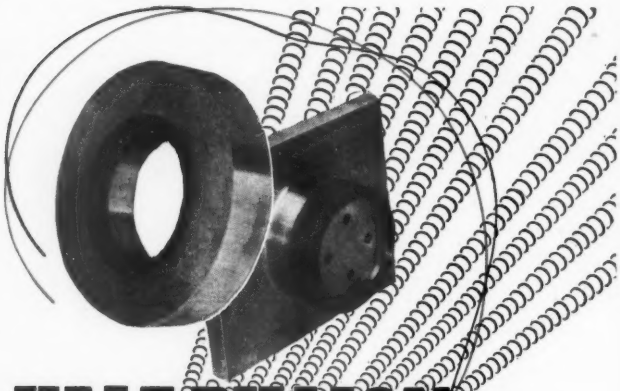


over a HALF BILLION "cookies" .... and STILL GOING

with these Diecarb dies

Several years ago, in a Pittsburgh electrical manufacturing plant, a disc or "cookie" die was placed in operation. It was made of Diecarb, Firth-Sterling's newest, original, sintered carbide development for blanking dies. This "cookie" die blanked a circle of silicon electrical sheet .025 inch thick, to be used in rotors and stators.

It proved so successful that since then two other similar Diecarb dies have been put to work—all averaging *50 to 60 million* blanks per grind, as compared with 90,000 pieces per grind with high speed steel dies.

The original die, at the latest count, had produced the unprecedented total of over a half billion stampings, and was still going!

In fact, the life of these remarkable Diecarb dies is not yet determined because all dies so far made, are still in use.

Diecarb can be used for blanking and forming a diversity of materials including metals, plastics, paper, etc. It operates successfully on thicknesses up to 7/16 inch. It is proving unmatchable for high production operations, saving both down-time and maintenance.

If you have a product that requires blanking or if you are planning one—call in Firth-Sterling now to test the possibilities of Diecarb.

GET IN TOUCH WITH US

A complete Diecarb engineering service is at your call—for designing complete dies; for aiding in application of Diecarb to die shoes by brazing; shrink-fitting; press fitting and mechanical matrix; and for proper grinding.

Firth-Sterling

STEEL COMPANY

Offices: McKeesport, Pa. • New York • Hartford Philadelphia • Pittsburgh • Cleveland • Dayton Detroit • Chicago • Los Angeles

Now

LEGS & BUTTONS
for Jigs & Fixtures
are
STANDARD
TOOL ROOM STOCK

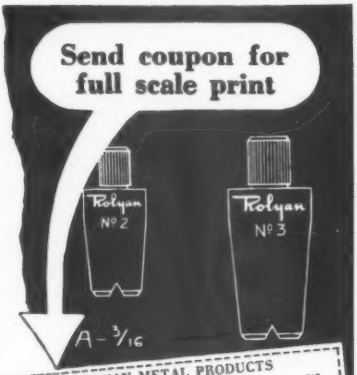
This latest Rolyan development

- Speeds production of Jigs and Fixtures
- Gets tools to the job QUICKER
- Saves drafting time
- Saves skilled man hours
- Saves machine time
- Facilitates engineered standardization of tool room practice.

Rolyan Legs and Buttons for Jigs and Fixtures are *precision made* for complete interchangeability. Shanks are knurled to *assemble with a press fit* in standard drill holes. Faces are *grooved* for chip clearance—hardened and *ground to close tolerances*. Chromium plated finish.

A great range of sizes *simplifies* engineered standardization of tool room practice. Mail the coupon or write for full scale dimensional print.

Send coupon for full scale print



ROLYAN METAL PRODUCTS
5735 S. Claremont Ave. Chicago 36, Ill.

Certainly we want to know about Rolyan Legs and Buttons for Jigs and Fixtures. Send full scale dimensional print and prices.

Company Name _____

Street _____

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Name of Individual _____

Rolyan
METAL PRODUCTS
5735 S. Claremont Ave. Chicago 36, Ill.

DUPLICATING IS OUR BUSINESS

THE *Fastest* WAY OF MILLING FORMING DIES

A SHORT-CUT THAT REDUCES COSTS!

STARTLING as it may seem to you if you have never tried it, the milling of forming dies can be done on an ordinary boring mill, equipped with a Turchan Follower Attachment, in one-half the time required by former methods, doing away with the necessity of buying special machines costing several times as much.

With only a plaster model as a guide, the Turchan attachment enables the cutting tool to duplicate the contours of the model in metal—automatically and so exactly that very little hand-work is needed.

If you are seeking ways and means of keeping ahead of competition by reducing your production costs, here is a labor-saving machine that will pay for itself in a remarkably short time in man-hours saved!

The Turchan Attachment is widely used not only on boring mills for making forming dies, but also on planers for making curved contours—on lathes for turning uneven shapes—on milling machines for machining irregular surfaces—and for making a great variety of other parts, doing the work 10 to 20 times faster than by former methods.

Write for Complete Information.

TURN TO TURCHAN

TURCHAN FOLLOWER MACHINE CO.
8257 Livernois • Detroit 4, Mich.

Hydraulic Follower Machine

Salvage

your surplus war plug gages —both plain and thread types

Plug gages of any make purchased for war production, unsuitable for your "peacetime" precision manufacturing, can be traded in on new *GO AND NO-GO Chromium Plated REVERSIBLE Gages*. The savings are substantial to users of Size Control quality gages.

These four features of Size Control *GO AND NO-GO Reversible Gages* assure even greater savings to new users:

Reversibility - provides for reversing plugs at each end of the universal handle.

Extra Length - plugs can be cut off an average of three times at each end as they become worn, giving six times more service life than ordinary gages.

OUTSTANDING VALUE
IN PLUG GAGES
Both GO and NO GO plugs readily reversed. Ample length to cut off end of plug when worn. Super-finished in controlled temperature and atmosphere for the ultimate in accuracy.
REVERSIBLE GO AND NO-GO
THREAD GAGES
Offer the same economies and high degree of accuracy assured by plain plug gages. Readily reversible — insure six times the service life of ordinary thread gages.
REVERSIBLE

Super-Finished - to minus 1½ micro inches, greatly reducing friction and increasing service life.

Colored GO and NO-GO Indicators - Green GO and Red NO-GO nuts for quick identification.

GO and NO-GO Plug Gages are available in all standard sizes, from stock. Special sizes made to order of Stellite, Carbide, Norbide and up to .250" in sapphire. Bulletin No. 945 will help to cut your inspection costs.

SIZE CONTROL COMPANY

DIVISION OF AMERICAN MACHINE & GAGE CO.

MAKERS OF PLAIN AND THREADED PLUG GAGES—GAGE SETS—DRILL SETS—FRACTIONAL SETS—THREAD WIRES—GEAR WIRES

Plant 4650 Fulton St. Chicago (44). Offices in Buffalo. Elmira. Rochester. Syracuse and New York City. Milwaukee. Detroit. Minneapolis. Cleveland. Indianapolis. and Greenwich. Conn.

4-TON CAPACITY
BENCH PUNCH PRESS

STAMPS, CRIMPS, MARKS, PUNCHES, RIVETS, FORMS – HANDLES MANY SPECIAL OPERATIONS

benchmaster—known for quality bench machine tools—aids high speed production with a versatile inclinable 4-ton capacity bench punch press.

For Light Sheet Metal, Plastics, Etc.

285 strokes per minute • Die Space: 4¾" when Ram "Up" • Ram Adjustment: 1 inch • Bolster Plate: 6"x 8" • Height: 25" • Weight: 185 lbs. • Motor: ⅓ H.P. • $127.50 F. O. B. Factory (less motor)

benchmaster manufacturing company

tools

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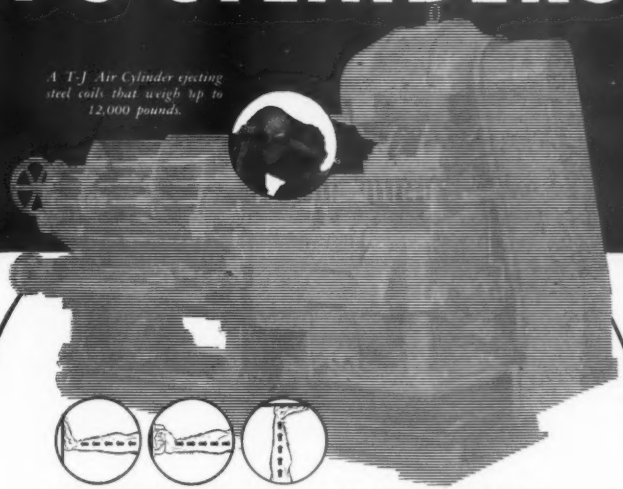
Simplify Your Machines

...SPEED PRODUCTION WITH

T-J CYLINDERS

A T-J Air Cylinder ejecting steel coils that weigh up to 12,000 pounds.



FOR PUSH-PULL-LIFT JOBS...100 LB. OR 50,000 LB.

Harness T-J Cylinders to your tough jobs of power movement—to improve performance of machines and equipment!

For presses—clutches—hoists—furnace and oven doors—material handling equipment—shears—damper regulation—and scores of other jobs where pushing, pulling or lifting is needed, use T-J Air and Hydraulic Cylinders! Available in many standard sizes and styles . . both cushioned and non-cushioned types. These Cylinders are T-J engineered to deliver maximum power movement in every stroke . . . dependably...with long life. Write for latest catalogs.
The Tomkins-Johnson Co., 620 Mechanic St.
Jackson, Michigan.

FOR TOUGH JOBS SPECIFY T-J

TOMKINS-JOHNSON

RIVETORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

HY-DRAULIC SHAPER-PLANERS ON FAIRBANKS-MORSE DIESEL BLOWER IMPELLERS....

Selected as original equipment for machining contours of Fairbanks-Morse diesel engine blower impellers, the installation of Rockford Hy-Draulic Shaper-Planers has grown to include the 8 machines shown above. For several years they have been running more than double time daily, and operating personnel has included several women. When permitted by the impeller schedule, several of the Shaper-Planers have been reverted to standard and used on high-priority tool and die work.

Rockford Hy-Draulic Shaper-Planers machine many other kinds of blower impellers and work-pieces having irregular shapes or contours. Hy-Draulic Shapers and Planers handle similar work in smaller and larger sizes respectively. They, too, can be reverted to standard for conventional shaping and planing. Investigate. Send drawings or samples for a sales engineering production proposal. Write to Department 2512.

4511

ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS

DIE SPRINGS

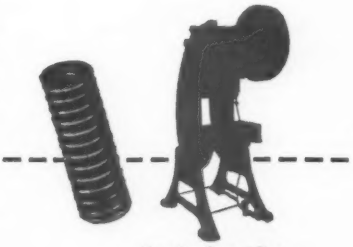
FOR ALL 3 PRESSES

● Don't run the risk of ruined dies or production stoppage by using die springs of the improper type.

High speed, regular speed and heavy duty presses each require springs of different design. Muehlhausen has all three, ranging in size from 1 to 15 inches length, from 3/4 to 4 inches diameter, and from 80 to 3000 lbs. load capacity. Ready for immediate shipment.

MUEHLHAUSEN SPRING CORPORATION
Division of Standard Steel Spring Company
875 Michigan Avenue., Logansport, Indiana

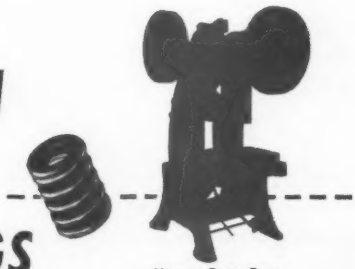
High Speed Press



Regular Speed Press

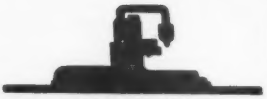
To improve product performance, use

MUEHLHAUSEN Designed SPRINGS



Heavy Duty Press

SET YOUR MACHINES LEVEL WITH Empco JACKS



Saves set up and re-leveling time

Self aligning on uneven floors

Accurate two-way adjustment

Machine Tool Manufacturers strongly emphasize the need, not only to set machines level, but to KEEP 'EM THAT WAY. Periodic re-leveling is essential for accurate work tolerances. How often, depends on the type of foundation. No method of machine setting is stable enough to maintain the accuracy of initial leveling. It is important to check after first month of operation, then check periodically and re-level whenever necessary.

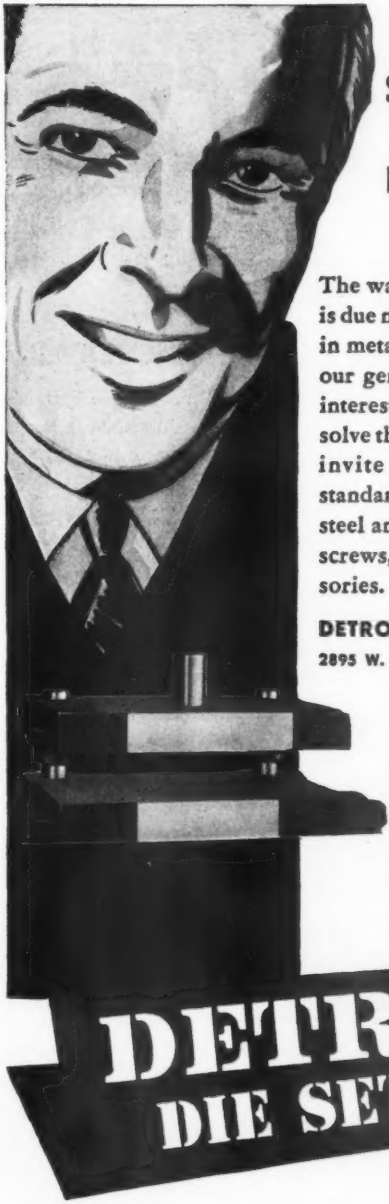
When a machine is set on EMPCO JACKS the whole operation is the work of only a moment: Simply apply a wrench to the "hex" screw head, turn right to lift or left to lower until your level indicator reads "zero".

Write for descriptive folder. Prompt delivery.

SIZES AVAILABLE
No. 1...2 " normal height
No. 2...2⅜" normal height
No. 3...3¾" normal height

EMPCO

THE ENTERPRISE MACHINE PARTS CORPORATION
2735 JEROME AVE. DETROIT 12, MICH.



NEED
STANDARD DIE SETS
OR
DIE MAKERS' SUPPLIES?
Call "DETROIT"

The wartime growth of our business is due not only to the general increase in metal-working activity but also to our genuine desire to serve the best interests of every customer, and help solve their production problems. We invite your inquiries regarding standard and special die sets, all steel and semi-steel, dowel pins, cap screws, die springs and other accessories.

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DETROIT
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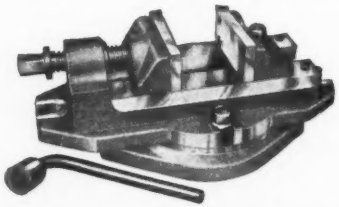
MODERN MACHINE VISES

For **EVERY** *use...* **EVERY** *day... in* **EVERY** *Shop*

Producto machine Vises embody all modern refinements in design, construction and material . . . are built not alone for normal shop operations but also to meet the toughest conditions of precise production.

SCREW ACTING VISES, 4½", 6", 9" capacity, Plain and Swivel types.
HARDENED AND GROUND TOOL ROOM VISES, 2 sizes, for finest tool work.
CAM LOCK VISES, 4", 5", 7", for Production Milling and Drilling operations.
SELF-CENTERING SHAFT VISE for holding shafts or spindles.
QUICK-LOK VISES, 3" and 4" capacity, inexpensive and useful.

General purpose 4½ inch plain and swivel vise, hardened and ground ways.



Send for bulletins which cover all Producto Vises.

THE PRODUCTO MACHINE COMPANY

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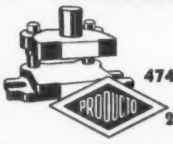
DETROIT
3017 Medbury
INDIANAPOLIS
139 West 16th Street



CLEVELAND
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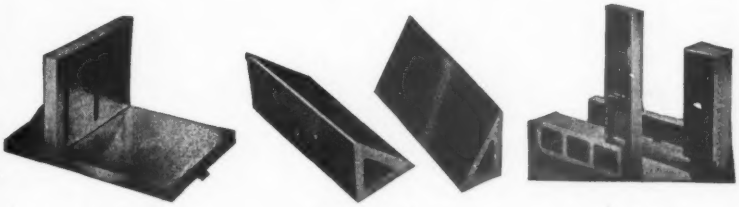
NEW YORK, 197 LAFAYETTE STREET

SOMETHING NEW HAS BEEN ADDED TO OUR LINE OF

MEEHANITE METAL PRECISION PRODUCTS



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Write for Literature

ACME TOOL COMPANY 196 CHURCH STREET NEW YORK 13, N. Y.

WITH Cadillac's new Pla-Chek you can get out five times as much surface plate inspection work as you do now—and it will be accurate because Pla-Chek is guaranteed accurate to .00005".

Pla-Chek is a hardened steel bar with 12 steps spaced exactly 1" apart; a micrometer screw thread ground on the lower end; a large micrometer thimble graduated in .0001" on the upper end of the bar and a simple triangular-shaped support bracket.

With this bracket set on a conventional surface plate and the micrometer thimble set at zero, the lower end of the bar is exactly level with the surface plate.

The micrometer is then set for the desired dimension in thousandths and tenths of thousandths and the measurement is taken from the desired inch step. Measurements are guaranteed accurate to .00005" for any size from .001" to 12" from the surface of the plate.

TWO WEEKS FREE TRIAL

So that your inspectors can see how much time Pla-Chek will save them, we will send it on two weeks free trial. If this trial satisfies you, send your check, if not, return Pla-Chek express collect and you owe us nothing.

Cadillac GAGE COMPANY

20316 HOOVER ROAD · DETROIT 5, MICHIGAN

METAL Stampings DUPLICATED WITHOUT DIES

With DI-ACRO Precision Machines

If you desire to save time and die expense on production of metal stampings or other small parts, then the DI-ACRO System of "Metal Duplicating Without Dies" merits your consideration. It is based on the rapid and accurate production of formed parts with DI-ACRO Shears, Brakes and Benders. All duplicated work is accurate to .001". These precision machines are adaptable to an endless variety of work, and ideally suited for use by girl operators. For short runs your parts are processed in a matter of hours instead of waiting weeks for dies.

SHEARS

Di-Acro Shear squares and sizes material, cuts strips, makes slits or notches, trims duplicated stampings. Shearing width—Shear No. 1—6". Shear No. 2—9". Shear No. 3—12".

BRAKES

Di-Acro Brake forms non-stock angles, channels or "Vees." Right or left hand operation. Folding widths: Brake No. 1—6". Brake No. 2—12". Brake No. 3—18".

BENDERS

Di-Acro Bender bends angle, channel, rod, tubing, wire, moulding, strip stock, etc. Capacity—Bender No. 1—$\frac{1}{8}$" round cold rolled steel bar. Bender No. 2 and No. 3—$\frac{1}{2}$" cold rolled steel bar.

Send for Catalog "DIE-LESS DUPLICATING"

It illustrates many stampings or parts made without dies, gives full details on DI-ACRO machines and shows how they may readily be adapted for various applications. Request your copy now.

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

← Pronounced "DIE-ACK-RO"

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15 holes in 15 minutes

Spotted, Drilled and Reamed to ±.0002"
by the
Coordinate Hole Location Method*

...because
Micrometer Lead Screws
Accurate to
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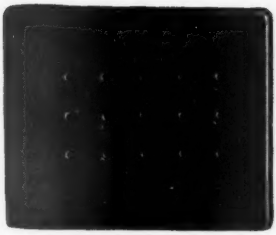
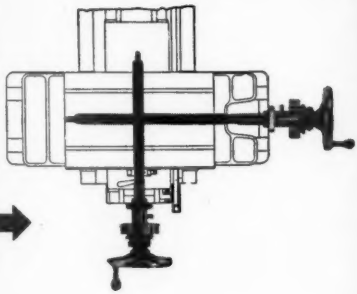
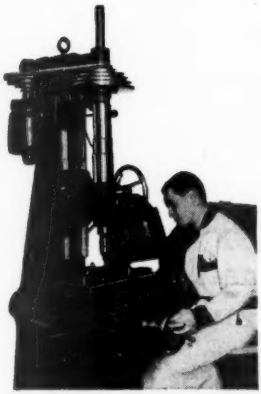
...Speed Table Settings
on the
MOORE JIG BORER



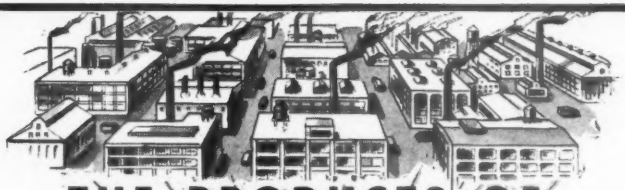




* One boring cut to increase accuracy to ±.0001" required only five minutes additional time for all fifteen holes. Write for descriptive literature.

MOORE JIG BORER

MOORE SPECIAL TOOL CO., INC., 726 Union Avenue, Bridgeport 7, Conn.



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The advantages of buying through your Industrial Supply Distributor are many and varied . . . such as . . .

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THE HENRY G. THOMPSON & SON CO.
Saw Specialists Exclusively for Over 65 Years
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AMMCO 7" SHAPER

A precision machine for precision work . . .

Phenomenal performance of this precision shaper in war production work is an indication of its great value in the postwar period when your competitive conditions put added importance on accuracy and low-cost production . . . The precise accuracy of work turned out on an Ammco 7" Shaper assures precision production unsurpassed by larger machines selling for hundreds of dollars more than the Ammco . . . In addition to low initial cost, you also effect big savings in time and expense on set-up operations . . . You save on electrical power consumption . . . You save on floor space—all without sacrificing quality or accuracy . . . Available for bench installation, or as a portable unit.

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Convert Clamping Time Into Production Time

USE KNU-VISE CLAMPS

—that will grip work instantly and release it just as quickly.

Utilize for production the time you now waste in tightening and loosening clamps on work. Only a flick of the lever is required to apply desired pressure and reverse motion to release.

There is a Knu-Vise clamping device for holding any sized part—under any condition—to meet any space accommodations—for welding, drilling, assembly, or fabricating operations.

Let us show you how you can speed production through better clamping.

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Now – MATCH THEIR BEST WITH YOUR MOST IN THE VICTORY LOAN!

Top off your good work on your Payroll Savings Plan with an outstanding showing in the Victory Loan —our last all-out effort!

Back the Victory Loan to help bring our boys back—and give our wounded heroes the best medical care. You know your quota! You also know by past war-loan experience that your personal effort and plant solicitation are required to make your quota!

Sell the New F. D. Roosevelt Memorial $200 Bond through your PAYROLL SAVINGS PLAN!

In rallies, interdepartmental contests, and solicitations, promote the new Franklin Delano Roosevelt Memorial $200 Bond! Better than "cash in hand," Victory Bonds enable buyers to build for the future!

Keep on giving YOUR MOST to the Victory Loan! All Bond payroll deductions during November and December will be credited to your quota. Every Victory Bond is a "Thank You" to our battle-weary men! Get behind the Victory Loan to promote peacetime prosperity for our returning veterans, your nation, your employees —and your own industry!

The Treasury Department acknowledges with appreciation the publication of this message by

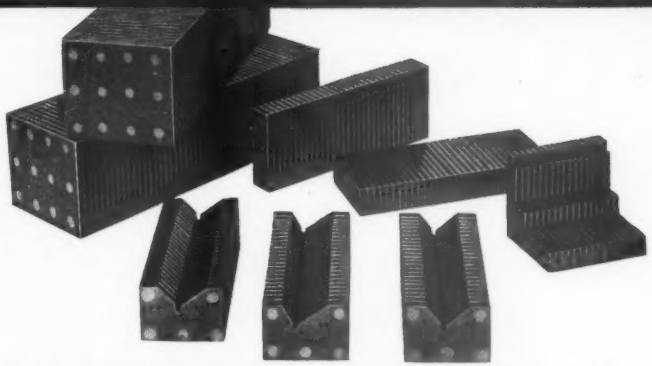
TOOL & DIE JOURNAL STAFF

VICTORY LOAN

This is an official U. S. Treasury advertisement prepared under auspices of the Treasury Department and War Advertising Council

SCHERR MAGNE-BLOX

PARALLELS V-BLOCKS ANGLE IRONS



Part held at true vertical by Magne-Blox angle iron and two parallels. The magnetic principle of holding work is applied by the vertical side of the angle iron, as well as by the horizontal face of the chuck. The small laminations in the Magne-Blox transmit sufficient magnetic holding power to eliminate the need of clamps.

The universal set of Magne-Blox — two parallels, two V-blocks. Complete with case, $14.50

Set of toolmakers' matched angle irons, in case, $45.00

-- they transform magnetic chucks into special fixtures

Have you odd-shaped or small pieces to hold on surface grinders? Scherr Magne-Blox will serve as extensions of your magnetic chucks, enabling them to grip in spite of projections, difficult contours, curved surfaces, and to hold the work in the position required. For instance, Magne-Blox angle irons permit of work to be held truly vertical, and at a vertical angle if desired, as accurately established with sine bar. Parallels in various dimensions, and V-blocks, can be combined to provide almost any holding contour the work requires. Available singly, in matched pairs, and in standard sets. Write for prices and full details.

Also, special Magne-Blox, such as the V-blocks shown above, which are ground to special angles. Write for quotations.

GEO. SCHERR CO., Inc. 200-B LAFAYETTE STREET NEW YORK 12, N. Y.

Tannewitz

the DI-SAW with Extra SPEED AND EXTRA STAMINA

Did you ever hear of a transmission going haywire on a TANNEWITZ DI-SAW? No, neither did we, though we have been making die saws for a good many years. And that's just typical of the superior construction of the entire machine. It can take the severest kind of use and always be ready for the next job. Moreover the standard model has larger wheels than customary in machines of this type — a full 24 inches — for greater traction, straighter, faster sawing and more production. Get the complete facts and you'll discover why TANNEWITZ DI-SAWS always show the best possible return on an investment in equipment of this kind. Write for "DI-SAW" Bulletin.

OTHER MODELS TO HANDLE WORK OF PRACTICALLY ANY SIZE

make available the tremendous savings of inside and outside sawing, filing and polishing on dies, jigs and other work too large to handle on the standard machine. Bulletin on request.

THE TANNEWITZ WORKS

GRAND RAPIDS 4, MICHIGAN

A New Precision Holder for Better Reaming

Here is a reamer holder built by reamer specialists, to bring to your turret lathes and screw machines, the full precision qualities inherent in L & I Ground Flute Reamers.

The L & I Precision Centering Reamer Holder establishes a new center absolutely true with the spindle axis, and drives the reamer from this dead center. *Reamer does not float* — but follows true centerline free from weight or pressure. No bushings — no bell-mouthing — no tapered holes — corrects diagonal errors in turrets.

Standard model holds reamers from 1/16″ to 7/16″ diameter interchangeably. Larger model for reamers 7/16″ to 1⅛″ diameter.

Write for bulletin giving full specifications and prices.

LAVALLEE & IDE, INC. • CHICOPEE, MASS.

L&I GROUND FLUTE REAMERS

"They shall beat their swords into ploughshares"—ISAIAH II: 4

* SEE BELOW

SWORDS TO PLOWSHARES

Conversion to peaceful pursuits will bring its own battles—to do things better, faster, cheaper and with less labor.

But there's one modern, speedy, economical method that any metal working plant can so quickly and easily adopt:

Metalite Belts - Idler Backstands

. . . with the minimum expenditure of time and money and no loss of present floor space.

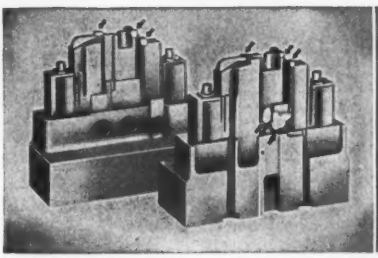
Just install an Idler Backstand behind your present lathe, substitute for the set-up wheel a resilient contact wheel, slip a Metalite Cloth belt over the latter and the pulley on the backstand, and you're off to higher speeds, better finish and sweeping reductions in "cost per piece sanded."

The examples shown in our illustrated bulletin give far more convincing details than we can possibly include in this short text. Just a few lines on your letterhead asking for "Plus Factors" will bring it by return mail.

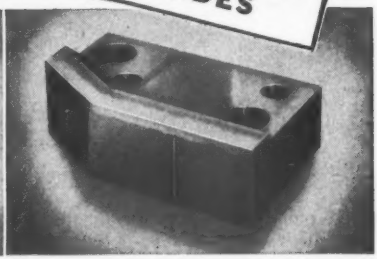
* Left: Grinding Machete Blade. Right: Finishing Plow Points.

BEHR-MANNING · TROY, N. Y.
(DIVISION OF NORTON COMPANY)
QUALITY COATED ABRASIVES SINCE 1872

4 WAYS TO SPEED RECONVERSION WITH Eureka Tool & Die Welding ELECTRODES



● Costly dies welded with Eureka Tool & Die Electrodes. These intricate units were saved at a small fraction of their replacement cost and were back into operation with minimum down-time. Man hours, material and production time saved.



● When practical, die units can be compositely fabricated by welding. Above die units compositely constructed with Eureka Tool & Die Electrodes. Heat treatment unnecessary, other than tempering. Last operation is finish machining.

● Design corrected or error rectified using Eureka Tool & Die Welding Electrodes. Weld deposit is roughly finished. You can make change in contours, corners or edges to correct design during die "try-out" or during "change-over" periods.

● Here is how welding rectified mistake in machining a new forging die. Error was corrected by building up with Eureka "Drawalloy" Electrodes, thereby saving $500 in time and material and eliminating unsatisfactory inserts.

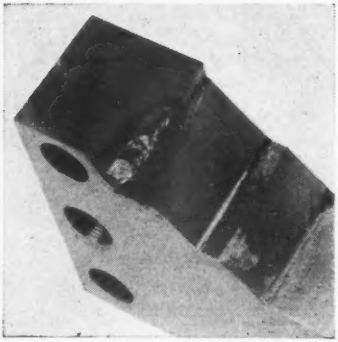
EUREKA STEEL ELECTRODES FOR EVERY TOOL AND DIE WELDING NEED

Welding Equipment & Supply Co.

PIONEERS IN TOOL AND DIE WELDING ELECTRODES

223 LEIB STREET • FITZROY 3715 • DETROIT 7, MICHIGAN

Quick, Economical Repairs to
DAMAGED DIES
with
PHILLIPS CRUCIBLE ARC No. 72 SPECIAL ELECTRODE



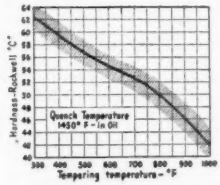
THIS repair of an oil hardening steel forming die is typical of repairs that are being made every day, saving hours and dollars with PHILLIPS CRUCIBLE ARC Tool and Die Steel Electrodes. No. 72 Special was selected for this job because it is particularly effective in cases where it is not practical to heat treat the piece after welding.

Deposits of No. 72 Special are very hard and tough in the as-welded condition, when properly applied. Hardness as deposited is approximately Rockwell C61 when cooled fairly rapidly, and the metal has high non-shrinkage characteristics. Hardness values obtainable by heat treatment are indicated by the accompanying curve.

This electrode will get your production manager out of many tough spots at a surprisingly low cost. Complete information on its use, with much valuable data on other aspects of metal arc welding on tool and die steels will be found in our handbook. Copy on request.

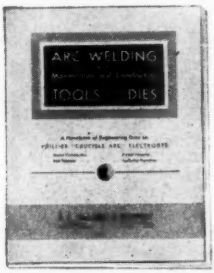
Application Procedure for No. 72 Special

Use electrode positive. Prepare clean, bright surface for each application. When multiple layers are deposited, clean carefully between layers. Current settings will be approximately the same as for mild steel electrodes of the same diameter. To obtain high hardness as welded, avoid heating the adjacent base metal above the tempering temperature.



Tempering Curve, No. 72 Special

No. 72 Special as Deposited (250 ×)



Send for this free manual on arc welding Tool and Die Steels

C. E. PHILLIPS & COMPANY

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Detroit 8, Michigan

332 So. Jefferson St.
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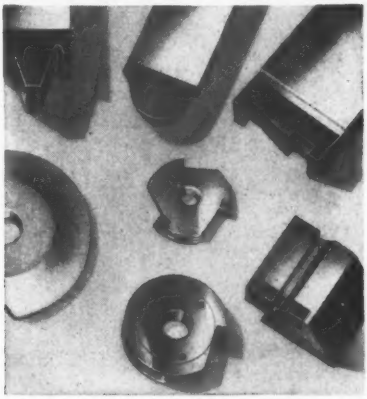
MANUFACTURERS AND DISTRIBUTORS OF WELDING ELECTRODES AND SPECIALTIES

NOW CRUSH DRESSING OF GRINDING WHEELS ... by Perfex

THIS REVOLUTIONARY NEW METHOD of dressing grinding wheels, with its much greater accuracy and increased speed, is taking industry by storm.

Perfex is especially pleased to announce that we can now furnish you crusher rolls (both thread and form) made to your own specifications.

Typical crusher roll shown above, will dress your grinding wheel in a fraction of the time previously required and with greater accuracy.



Perfex is also prepared to offer you Carboloy or high speed steel circular, flat or dove-tail forming tools such as those shown above.

If you are not already familiar with the story of crush dressing of grinding wheels, we will be glad to answer your questions. Write us today or ask for quotations.

PERFEX GAGE & TOOL COMPANY
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ACCURACY PERFEX OUR CREED

Pickering Governors, such as the one shown here, control the speed of prime movers, within 1/100 of 1 per cent, thus accuracy is an absolute essential.

Tolerance .00007"

with Sunnen Precision Honing *Plus* Selective Fitting!

At the Pickering Governor Company special parts are machine reamed to .003" undersize; then sized and finished on the Sunnen Precision Machine to a tolerance of .000125".

This is not an isolated instance. Hundreds of Sunnen Precision Honing Machines are doing similar jobs in hundreds of manufacturing plants.

Let a Sunnen engineer show you how this machine can be used on your jobs — or write for free bulletin.

The SUNNEN Precision Honing Machine

- Handles diameters from .185" to 2.625"
- Produces super-smooth finish of 2 to 3 micro-inches
- Can be used in any metal or plastic except lead and babbitt
- No jigs or fixtures needed
- Does not require skilled labor
- Can be "set-up" for any size in one minute
- Economical to operate

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SUNNEN

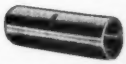
Typical Jobs

Aircraft Hydraulic Brake Cylinder. Honing 3 times faster than lapping — and gave a straighter hole.

Aircraft Valve Tappet Roller. Honed after grinding to give 100% bearing surface.

Aircraft Carburetor Operating Valve Sleeve. Sunnen honing eliminates distortion from assembling operation.

Hydraulic Control Bushing. Honing gives straight round hole after rough reaming.



Aircraft Piston Pin. Sunnen honing is twice as fast and gives a cleaner, better looking pin.

Carburetor Idler Valve Jet. Hole is honed after reaming for smooth action.

Bearing. A very small part. 2 micro-inch finish necessary.

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CHECKS DIAL INDICATORS

Micrometer speed with sine bar precision — the fastest, most accurate method ever developed for checking dial indicators! Clarkator gives 100% inspection on every vital point. Checks comparators, hardness testers and all other instruments requiring precision dial indicating.

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Be sure of absolute accuracy of indicator readings. Put Clarkator to work for you. Regular use will provide a saving in test results alone worth many times its low cost! Illustrated 2-color circular contains complete descriptions and specifications of the Clarkator. Write for your free copy today! Dept. TD.

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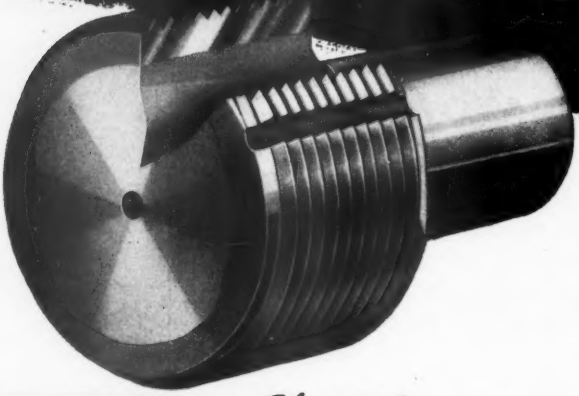
TOMORROW'S ACCURACY TODAY

HARDNESS TESTER

Clark Instrument, Inc., 10200 Ford Road, Dearborn, Mich.

MAKE 1 GAGE DO THE JOB OF 20!



GRIFFIN *Chrome Carbide* THREAD GAGES DEFY WEAR

Results in hundreds of plants show Griffin CHROME-CARBIDE Thread Gages are averaging 20 times longer life than tool steel gages! Thread gage costs are being lowered, rejects saved, and innumerable hours of inspection and setting time are eliminated.

WHAT ARE GRIFFIN GAGES? CHROME-CARBIDE has long been known for its wear resisting qualities. Griffin applies CHROME-CARBIDE alloy over new gage blanks made from your worn gages, by a welding process. New threads are then ground in this solid deposit and diamond lapped to specified tolerance.

GRIFFIN GAGES HOLD SIZE. Many records for long life have been established by Griffin Thread Gages—Some amounting to *60 times longer* than tool steel! Since gages stay on size so much longer, gage replacements are cut, overhead reduced and risk of rejecting acceptable parts because of unsuspected gage wear is largely eliminated.

HOW ABOUT COST? Considering their increase in life, Griffin CHROME-CARBIDE Gages cut gage costs to as little as ⅓ of normal! Thread plug sizes can be furnished from ¼" O.D., thread ring sizes from ¾" I.D. Distributors in principal industrial cities. Write for quotations and prompt service!

GEORGE O. GRIFFIN COMPANY

1307 WEST HADLEY STREET • WHITTIER CALIFORNIA

Chrome Carbide Thread Gages

Check Your CENTER of GRAVITY!

A Shaper is the center of gravity of the balanced tool room and die shop. Cincinnati Shapers are accurate, powerful, responsive. In batteries in the large plants, or singly in the small shop, Cincinnati Shapers give outstanding value

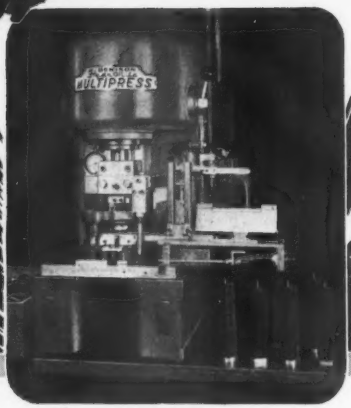
Write for Catalog N-2

THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A.

SHAPERS BRAKES SHEARS

MULTIPRESS SHAVES Production Costs for GILLETTE



Higher Output on Precision Punching Operation

MULTIPRESS proves its advantages on another task . . . punching key slots in metal safety razor guards at the Gillette plant in South Boston. Performance records show reduced "downtime" for maintenance and tooling "set-ups" . . . thus, *higher* daily production. Reduction of noise is another important factor. And this completely self-contained, fully automatic, HydrOILic press occupies less space then previously used equipment. In this case, the user designed his own automatic feed device for the versatile MULTIPRESS . . . made easier by the unit's clean lines and smooth surfaces.

Built in 4, 6, and 8-ton capacities, MULTIPRESS is bringing similar production gains and efficiency to scores of production jobs. Standard accessories, such as, straightening fixtures, extension tables, bolster plates, indexing tables and others are available for these manually controlled or automatic cycling units . . . plus the amazing new Vibratory Ram Action, which provides automatically-delivered, short ram strokes at frequencies up to 500 per minute, with each of those strokes exerting closely regulative, uniform pressure on the work! Even the number of those vibratory strokes per ram cycle may be automatically controlled. Write for details today!

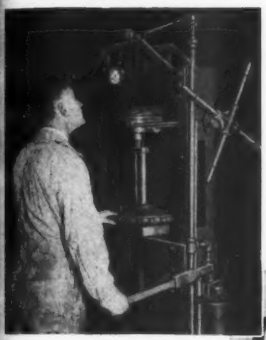
The DENISON Engineering Company
1197 Dublin Rd., Columbus 16, O.

DENISON EQUIPMENT for APPLIED HydrOILics

HERE'S WHY KRW PRESSES ARE BETTER

STUDY THESE KRW FEATURES IN TERMS OF YOUR MANUFACTURING OPERATIONS . . . *Your profits!*

THIS...



★ **CONVENIENT PUMP HANDLE LOCATION.** The only correct pump handle location is slightly below a man's waist level. There's no straining to pump awkwardly, creating worker fatigue. Operator is free to watch the near-eye-level pressure gauge.

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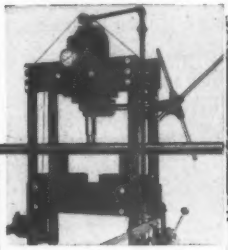

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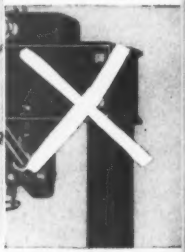

★ **OPEN ENDS FOR LONG WORK.** Permits any length work to be supported on V-Blocks directly under the ram. On other presses work must be passed through diagonally. KRW Presses handle long shafts and bars without loss of speed or accuracy.

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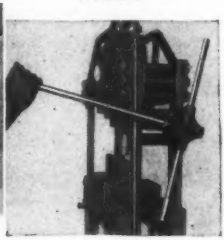

★ **"BUILT-IN" MECHANICAL ARBOR PRESS.** Provides the advantages of the large adjustable press bed . . . makes possible the use of V-Blocks where necessary. Hand wheel operates the ram mechanically with 3 to 4-ton pressure. You can switch to hydraulic pressure by flipping the valve control.

★ Here, on these pages, you can see the proo of KRW superiority... no other hydrauli arbor press can boast of these money-savin features. Before you buy any other make o hydraulic arbor press, check their value t you in terms of your own daily operations.. manufacturing costs...employee morale...an Profits. Many operations that can be don easily on a KRW Press cannot be handled a all on other makes of presses. Using simple inexpensive dies, it is possible to perform many bending, straightening, flattening, off setting, assembling and other operations a lower cost per unit. Investigat... our special Hydraulic Pres Catalog will give you all the fact you want. Write for it today

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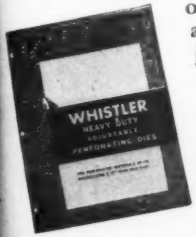
...EASY WITH WHISTLER HEAVY DUTY ADJUSTABLE DIES

Manufacturing costs can be materially reduced and conversion speeded up by putting the "SX" series of heavy duty adjustable perforating dies to work in your plant.

Available from stock in standard sizes and shapes from 1/8" to 1½". Continued reuse in different groupings spreads original costs over a multitude of jobs. Closer centers permit more perforations per press operation. Absolute accuracy on short or long runs. Quick changeover of hole arrangements contributes to greater production from your presses.



If perforating, notching, slitting or rounding dies are used in the manufacture of your products and you are working with materials up to 1/4" steel, then good business dictates that you write for the Whistler catalogs and know the time and money saving advantages of Whistler Heavy Duty Adjustable Dies.

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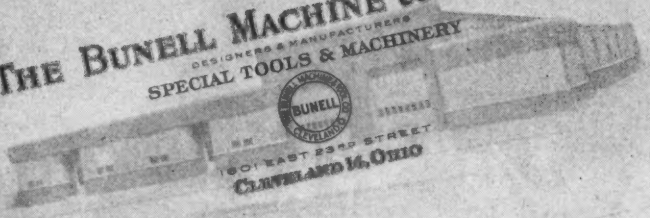
THE BUNELL MACHINE & TOOL CO.

DESIGNERS & MANUFACTURERS
SPECIAL TOOLS & MACHINERY



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Anywhere, U.S.A.

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We are ready to design and build tools to solve all your production and engineering problems.

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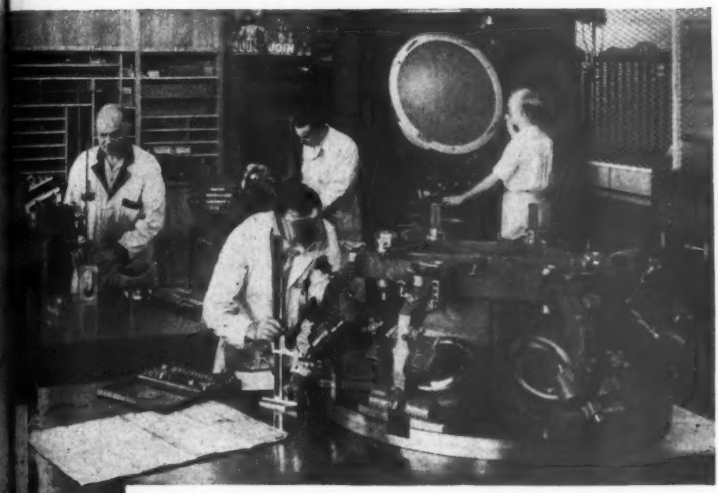
P. S. For 25 years we have been designing and building special tools and special machinery.



Our inspection facilities consist of modern equipment, always adequate for specified tolerances. Our inspection engineers are qualified and experienced.

DESIGNERS AND MANUFACTURERS OF

Tools • Special Machinery • Dies • Jigs • Gages • Fixtures

PRECISION PRODUCTION OF PARTS AND ASSEMBLIES

TOOL STEEL DATA

Revised data for Hot Work and Shock Resisting Die Steels including types, analyses, uses, hardening characteristics and temperature ranges

NOVEMBER, 1945

HOT WORK AND SHOCK RESISTING DIE STEEL CHARACTERISTICS

TYPE	GRADE	ANALYSIS	USES For Hot Work Dies and Tools, and Tools Subject to Severe Shock Requiring:	HARDENING CHARACTERISTICS	
				HARDENING TEMPERATURES	QUENCH RC
High Tungsten	FORMITE	C .35 Cr 4.00 W 13.50 Mo .40 V .35	• Highest Resistance to Heat • Long Wearing • High Strength	Range: 2150° F. to 2250° F.	Oil..... 48-53 Air..... 45-50
Chrome-Molybdenum	FIREDIE	C .35 Si .95 Cr 5.25 Mo 1.35 V .50	• Best Resistance to Fire Checking • High Shock Resistance • Air Hardening in Massive Sections	Range: 1800° F. to 1850° F. The total time allowed for preheating and holding at the hardening temperature should be at least 3 hrs. per inch of thickness.	Air 50-55
Low Tungsten	BUSTER	C .60* Si .70 Cr 1.20 W 2.15 V .25 *other carbons available.	• Working Temperatures Up to 800° F. • Greatest Shock and Pressure Resistance.	Range: 1650° F. to 1750° F.	Oil..... 50-60 Hardness depends on Carbon, Mass and Hardening Temperature.

TEMPERING: For hot work the rule is: temper at as high a temperature as working conditions will allow. Double tempering of FORMITE and FIREDIE is recommended. FORMITE and FIREDIE are usually tempered between 1000° F. and 1300° F. For BUSTER the range is from 400° F. to 800° F.

COLUMBIA TOOL STEEL CO.

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MOUNTED WHEELS. The largest assortment made with a shape and abrasive to take care of every internal and external finishing job.

CUT-OFF WHEELS. All types and sizes. Now offered with the sensational new special-formula RT Bond (rubber or resinoid).

★ Half a century of specialization has established our reputation as the Small Wheel People of the Industry.

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- **Die Steels**
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  Cast Alloy for Metal-Cutting Tools.
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devotes its entire facilities to supplying the maximum attainable quality in tool and die steels. At every stage in production . . . from painstaking metallurgical research . . . through closely controlled mill procedures . . . to the final inspection of the finished steel . . . *quality* is the watchword.

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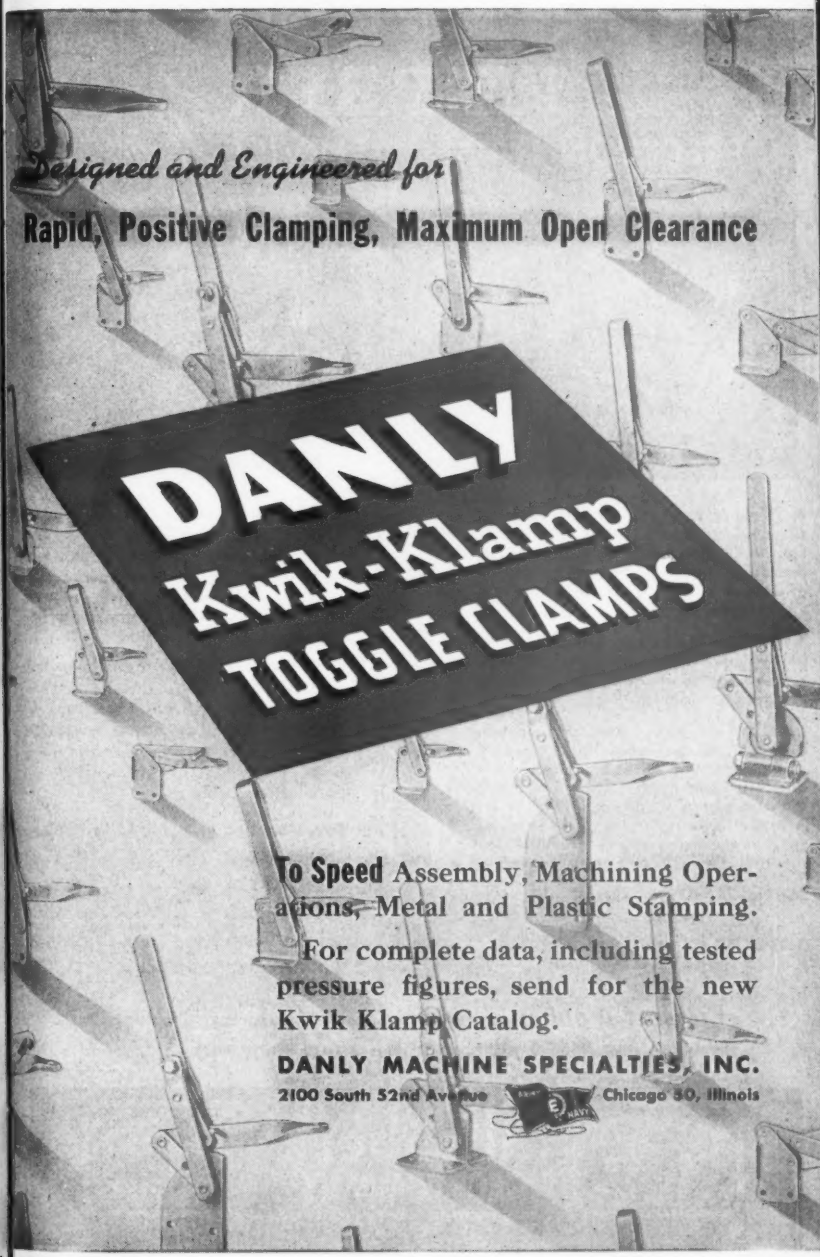
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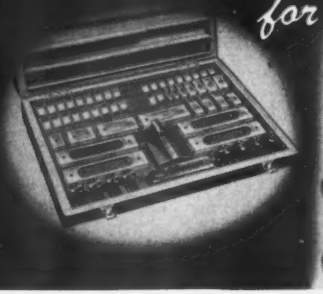
You need **WEBBER** *Now*

PRECISION GAGE SERVICE *for Reconversion*



● Webber Heavy Duty Gage Blocks are made to stand the punishment of continued shop use. They bring to shop operations measurements in millionths of an inch by direct application of the gage blocks.

With these blocks you can build up a height gage—an inside or outside caliper—or a precision divider in a fraction of the time required with any other set.

The use of the patented eccentric clamps and patented quick acting clamp eliminates necessity for screws—nuts—or loose rods and permits much quicker assembly of measuring unit. Another advantage which assures greater accuracy is that no holes are required through measuring surfaces.

Set No. 24 HD (*Heavy Duty*) **$385.00**

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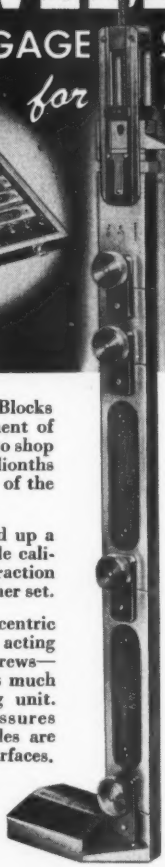

You have available in Webber standard gage sets a range of blocks to meet tool room, laboratory and manufacturing needs for precision measurements. The "A" sets are guaranteed within .000004 inch accuracy and the "B" sets within .000008 inch.

Webber gage blocks have the four essential qualities for precision measuring — **dimensional accuracy — stability—surface finish—wearing quality**—and provide twice the measuring range of the average set—at no additional charge.

Set No. 84A	. . . . .	**$350.00**
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Set No. 43A	. . . . .	**$185.00**
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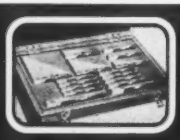
Consult Webber **on your precision measuring problems.**

Webber Gage Blocks will save time—errors—and costs.



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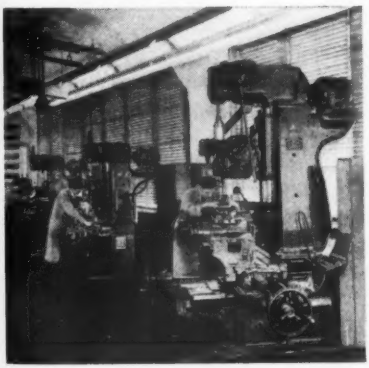
The same foresight that prompted us to include 10 Jig Borers in our list of equipment, guided our selection of all of the facilities of our modern plant.

Our service includes Design, Development and Construction of Tools, Dies, Jigs, Fixtures and Custom Built Machines plus manufacture of precision parts in units, pilot lots or production runs.

Phone, wire or write today. No obligation, of course



Two Views of Jig Borer Department

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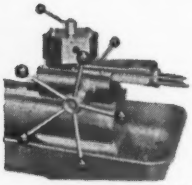
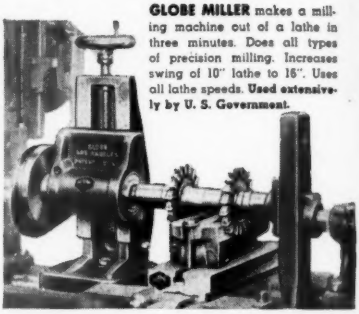
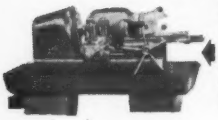


GLOBE HEAVY DUTY BED TURRETS. Adaptable to any make of 9" to 12" lathe. 4¾" travel. Precision built. Rugged construction.

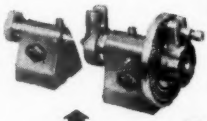
GLOBE CROSS SLIDE. Adaptable to any make of 9" to 12" lathe. 3½" travel. Rugged construction.



GLOBE MILLER makes a milling machine out of a lathe in three minutes. Does all types of precision milling. Increases swing of 10" lathe to 16". Uses all lathe speeds. **Used extensively by U. S. Government.**



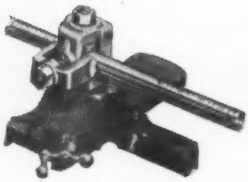
GLOBE HAND SCREW MACHINE produces precision parts at high speeds, low cost. Ball Bearing Headstock. 10" swing, 1" capacity, 12 speeds up to 3126 RPM. Exceptionally rugged construction.



MILLING VISE (below) with replaceable jaw plates. Jaws 3½" wide, 3" opening, 1⅜" deep. Larger sizes available.

DIVIDING HEADS. Precision built. Various sizes available.

BORING BAR HOLDERS AND BORING BARS (Formerly known as the "Clayton")



OUTSTANDING FEATURES BORING BAR HOLDER:

Duplicate Operations
Boring Bar Holder can be removed from lathe without affecting Boring Bar setting. Identical set-up may be retained for later duplicate operations.

Save Set-up Time
Bars can be changed, tool bits raised or lowered, distances lengthened or shortened between the tool bit and the body of the holder—all without disturbing the alignment of the holder with the lathe.

Speed Production
Boring Bar of any fractional size (within capacity of Holder) is instantly centered and clamped without sleeves or fingering adjustment of center post.

OUTSTANDING FEATURES GLOBE BORING BAR:
½" calibration markings assist settings, minimize vibration, permit heavier cuts.

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☐ Globe Miller ☐ Globe Cross Slide
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My lathe is_____ (MAKE) (MODEL) (SWING)

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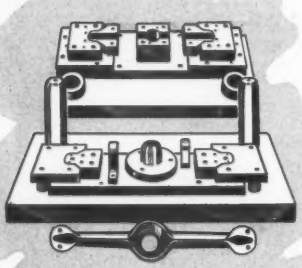

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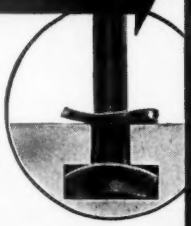

Worn, distorted Bolts like the one shown in the circle can damage the accuracy of machines, making costly repairs necessary.

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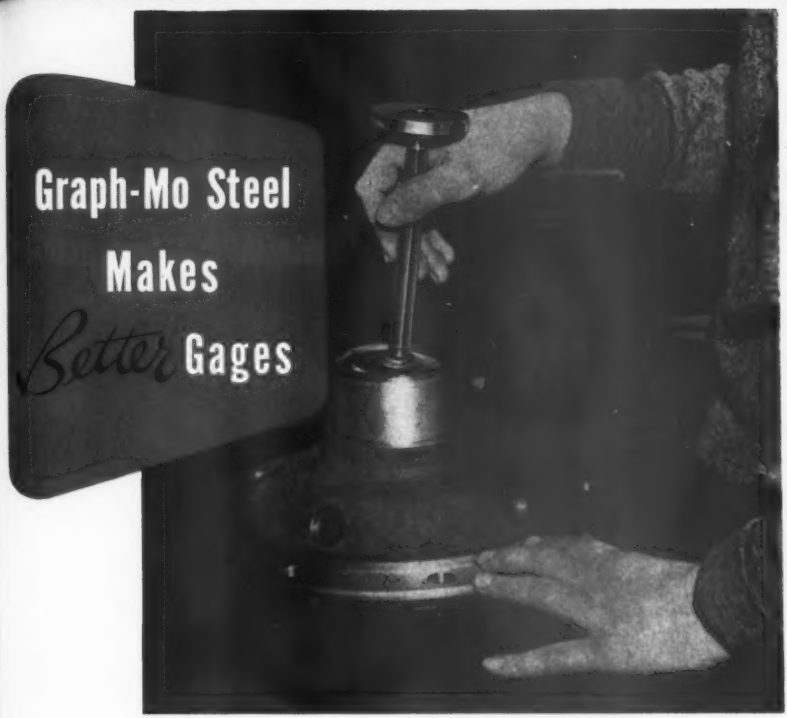

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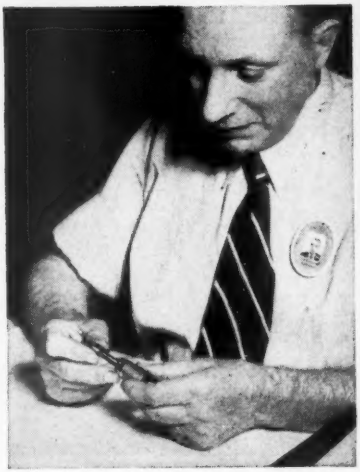

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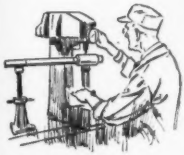
Testing Saddle Cross Slide



Testing Hardness of a Headstock Spindle Bearing Surface

Testing a Lead Screw

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This "built-in" precision makes possible heavier cuts and feeds, easier operation, longer life, and greater accuracy. It pays dividends to the users of these lathes in better and faster machining. Examine your metal working requirements in view of the advantages that can be obtained through the use of South Bend Lathes. Write for new, full color catalog, No. 100-D.

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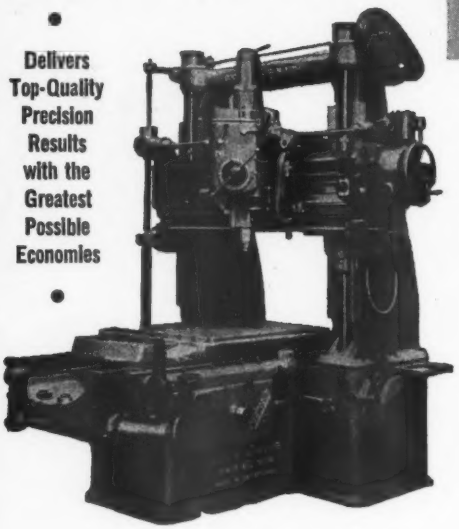

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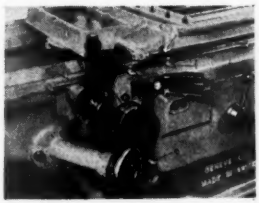

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1. Ample capacity to drive 3" dia. high speed twist drills to limit of their capacity in SAE 1035 steel.
2. Flanged quill spindle construction for most efficient adaptation of multiple head.
3. Six instantaneous changes of speed with one convenient control lever.
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6. Available in various sizes all with multiple splined spindle top driving ends and multi-vee belt drive.

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Oct. 21, 1944 · June 25, 1945

Scrape off the war paint from any BAKER Standard Vertical Driller built during the war years and you'll have an accurate, dependable machine ready to go to work for you on peacetime production. It's almost as simple as that: because every one of these war born BAKERS was designed with an eye to its easy retooling for a wide variety of jobs; and every one of them was built of the *best*—built to last.

We want to keep every BAKER Machine at work when its war-time job is done, whether in the hands of its original owner or a new owner. To that end we pledge our wholehearted co-operation and that of our dealers in any problems concerned with the refitting of BAKER Machines.

For complete information write, wire or phone the serial number of the BAKER Machine you are considering. We'll give you its history, tell you what it's capable of doing. You'll not be obligated in any way.

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**Includes Hearth Plate*

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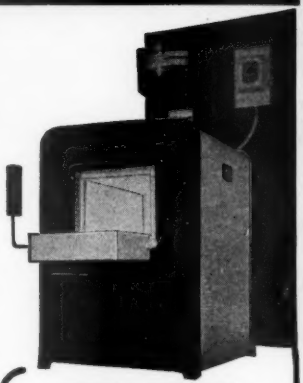
AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—$152.40.



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BUSY TOOL ROOM CONCENTRATES ON *DUMORES!*

On a lathe, Dumores are usually mounted on the compound and fed to traverse the work. Here, however, the unit is mounted on the fixed support or column of the stationary grinder; the work, supported by an arbor, moves back and forth over the table of the machine.

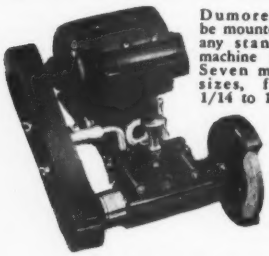
PRECISION, ADAPTABILITY AND VERSATILITY PROVIDES LOW COST TOOL MAINTENANCE

● At the Cullman Wheel Co., of Chicago, volume producer of sprockets and speed-reducing devices, many tools like hobs, cutters and reamers must be sharpened carefully for close precision work.

Though no definite tolerances are set, resharpened tools must be as accurate as new. Tooth pitches have to be right and the diameter of various cutting edges, all around, uniform without irregularities or chatter marks.

With work quantities small and each job different, they were able to reduce set-up time and grinding cost by mounting Dumores on their machines. Each Dumore, with its perfectly balanced motor and vibrationless spindle, was capable of accuracy to ±.0001". And spindle speed could be controlled for the best results.

Because such performance is common with Dumores, though applications vary greatly, we invite you to investigate these dependable, precision grinders. The Dumore Company, Tool Division, Dept. TL42, Racine, Wisconsin. (Eastern Sales and Service Branch, 13 East 40th Street, New York 16, N. Y.)

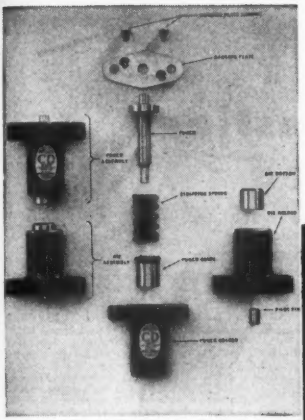


Dumores can be mounted on any standard machine tool. Seven model sizes, from 1/14 to 1 h.p.

DUMORE

PRECISION AND HAND GRINDERS

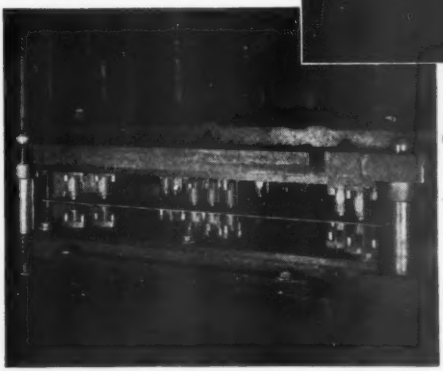
Sold by Authorized Industrial Distributors in All Principal Cities.



Showing all parts of Wales Type "CD" Units assembled and disassembled. These parts are easily assembled and disassembled for quick changes.

SIMPLIFY...
STANDARDIZE...
SAVE WITH...

WALES
TYPE "CD"
HOLE PUNCHING UNITS



Illustrating the work being punched with stamping press ram in down position.

Showing the work in a press brake-set-up. Note unobstructed feeding of the work.

● The customary expensive and time-consuming methods usually associated with building a single purpose die to punch a multiplicity of holes *is eliminated* with Wales Type "CD" Hole Punching Units.

SAVE making special punches and punch plates, special stripper plates and special die buttons and die plates.

SIMPLIFY die design and die making.

STANDARDIZED Wales punches, dies, and stripping mechanisms permit units and parts to be carried in stock for setting up and servicing.

Write TODAY for functionally colored, 32-page catalog with 48 illustrations showing these Units being set up and operating in stamping presses and press brakes.

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355 Payne Avenue
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(Between Buffalo and Niagara Falls)

GEORGE F. WALES, President

Specialists in Punching and Notching Equipment

Continued

Grinding Questions Answered

By Allen Steele, Manager, Dayton Grinding Wheel Division
SIMONDS WORDEN WHITE COMPANY

This series of questions and answers is presented as a practical aid in the solution of many of the more common grinding problems. Readers are invited to send in their own grinding questions, without obligation of any sort. All questions will be answered by mail or in this column. No identities will be revealed if published.

1 Q. *"We are doing a cylindrical grinding job and think the wheels we are using are a little on the 'soft side' for this work. Is there any way to make these wheels act harder?"*

A. Try decreasing the work speed (not wheel speed). This usually makes a wheel act somewhat harder and may enable you to use up your present wheel stocks.

2 Q. *"Is there any certain point where a wheel should be tapped to tell whether or not it is cracked?"*

A. Yes. With the wooden handle of a screw driver tap the wheel lightly at a spot about 45 degrees on either side of the vertical diameter.

3 Q. *"Is there any difference in the cutting action of a wheel as it wears smaller?"*

A. As a grinding wheel wears smaller its cutting action tends to act softer. It also requires more frequent truing.

4 Q. *"Please recommend a good 'general purpose' wheel for a Model B, Thompson surface grinder. We want a wheel that can be used for grinding both mild and hardened steel and that will give a fairly good finish."*

A. For the kind of machine you mention, one of the best "general purpose" wheels we know of is our 8A-46 K-15-V-25 Dayton (old marking 846 K-1-V). Processed of size 46 Dayton Refined Aluminous Oxide grain, with a vitrified bond and of very open structure, this wheel does a very good grinding job on a wide range of materials. It cuts fast and cool, gives an excellent finish; requires a minimum of dressing; wears at just about the right rate for efficient cutting action.

5 Q. *"We have a new grinding job that requires a high finish, but all too frequently scratches appear on the finished part. Could this be the fault of the wheels we are using?"*

A. We doubt very much whether such scratching is the fault of the wheels as all wheel manufacturers take the utmost precautions to prevent the inclusion of any foreign materials or larger grain sizes than those specified from getting into the wheel. In all probability the scratching is due to small particles getting into the coolant. We suggest you take steps to see that the coolant is properly filtered and also that the tank is frequently cleaned.

6 Q. *"Which is the most important —the pressure of a coolant at the point of contact between the wheel and the work, or the volume of coolant?"*

A. Since the chief function of a coolant is to dissipate heat, it naturally follows that the more coolant you use the more heat it will dissipate and carry away. Hence, the volume of coolant used is more important than the pressure employed.

7 Q. *"Does the shape of the material to be ground have any bearing on the work-speed?"*

A. The shape of the piece to be ground has a lot to do with the work-speed. If the pieces are irregularly shaped, such as camshafts, the work-speed must necessarily be slow in order to follow the track. For rough grinding, an F.P.M. somewhere between 15 to 30 is usually the most efficient work-speed, whereas for finish grinding the work-speed is reduced to 10 to 15 F.P.M.

8 Q. *"Is there any rule to determine the number of steady-rests to use in cylindrical grinding?"*

A. A very practical rule in this regard is to use from six to ten diameters of the work as the spacing between rests. This is an especially good rule when grinding long and thin work. But no matter how thick and short the work may be, it does no harm to use at least one rest as it will prevent vibration when heavy cuts and rapid table feeds are used.

9 Q. *"We are grinding hardened steel parts for use on a gun mount. The wheel we have been using is a soft, vitrified wheel, 46 grit. It has done a good job. But recently, there are chatter marks on the work. What could be the cause of this?"*

A. Since the chatter marks are a recent development, we think the wheel you are using can be eliminated as a possible source of the trouble. Suggest you check the machine itself and the headstock for vibration. Usually, if the chatter marks are fine, it will be found that the entire machine is vibrating excessively. If the chatter marks are somewhat coarse, are spaced evenly, and run longitudinally, the vibration can be traced to the headstock.

READY NOW...a guide to better grinding!

101 "Answers" to everyday grinding problems—indexed for quick, easy reference—will be sent FREE to anyone interested in better grinding practices. Just fill in and mail coupon below.
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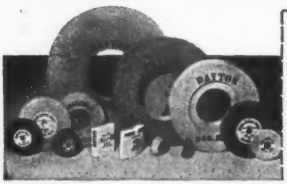
DAYTON GRINDING WHEELS



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● Typical of the scope and versatility of CLEVELAND Twist Drills. A 3½" hole drilled in a duralumin aircraft landing gear box plate . . . on a production line drill press!

Whether drilling specifications call for holes .0135" or 4" in diameter, there are CLEVELAND Twist Drills to fit. For nearly three quarters of a century the ✦ trade mark has represented uniformly high quality and dependability.

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compulsory arbitration is not arbitration

As this page goes to press, on the eve of President Truman's Labor-Management conference, some current views and expressions of the American Arbitration Association are so pertinent and timely as to warrant editorial presentation to our readers.

Our economy is beset by strikes, pending strikes and strike threats. Epithets and recriminations cloud the issues and the resultant discomfort, disruption and disorder affect the public, first in one phase and then in another.

When any particular situation grows grave enough, some public official, it may be a mayor, governor, or the President of the United States, steps into the breach and declares that the parties simply must arbitrate. And so, under official prompting or prodding, they ultimately do what they should have done voluntarily and by mutual choice in the first place.

Why is it that people who believe in voluntary arbitration, who resist the idea of turning over the direction of labor relations to a governmental bureau, repeatedly follow a course of action that is a direct bid for legislative and administrative regimentation of both industry management and labor management?

Why is it that both sides seem to have to hurl ultimatums at each other for a week or more before Reason is allowed to take control, and the merits of the dispute are submitted to impartial, calm and expert analysis and decision?

Is it not about time for Reason to be chosen by the parties to govern the settlement of a dispute at its inception instead of after it has done untold harm, not only to the "innocent public" but to the disputants themselves, who more often than not are an appreciable cross-section of that same public?

The alternative is shaping up in ominous rumblings. Compulsory arbitration is looming on the horizon. Distracted and confused by the failure of some self-centered leaders on both sides, the public might be led by clever demagogues to believe that this country should embark on the road of compulsion in this field. It might fail to see, until too late, that compulsion here would be the first fatal step along the path toward total regimentation.

Arbitration is voluntary or it is not arbitration. "Compulsory arbitration" is the incorrect term for a procedure which violates the basic concept of arbitration. Compulsory adjudication has its proper place in a democracy, but it should not borrow the cloak of arbitration which establishes its jurisdiction only when the parties to a dispute agree to arbitrate.

America has built the greatest industrial enterprise in the world, and has at hand the machinery, the brains and the formula for settling, by peaceful means and through self-regulation, the conflicts that change and growth make inevitable.

As *The New York Times* sums it up in the lead editorial of October 5, 1945 . . . "For compulsory arbitration would, in the end, mean general Government wage-fixing. This would lead to permanent Government price-fixing. All this would only be a different name for a regimented, totalitarian economy."

E. Willard Cunningham

editor

Comments on Buying Surplus Machine Tools

The purchase of surplus machine tools from the Reconstruction Finance Corporation became a maze of confusion when the suddenness of V-J day burst upon a high geared production atmosphere. Contract terminations and the accompanying reams of governmental reports seemed endless to the average individual concerned with planning the purchases of surplus machine tools. The

by A. W. Ehlers
CONTRIBUTING EDITOR

evident lack of centralized planning was certainly not the fault of the various Army, Navy and Air Corps certifying agencies whose overlapping functions had successfully fought through the procurement of the much needed equipment at a time when speed was the keynote. And it certainly is not the fault of the Reconstruction Finance Corporation now that it has the entire program of machine tool disposal dumped into its lap. Rather, it is the inevitable result of the accumulation of data on hundreds of thousands of pieces of equipment which has to be verified, checked and sifted into some presentable form for the "offer of sale". It is indeed a picture of detail that any well organized firm of certified public accountants would shun as almost impossible.

Several "packaged" plans were propounded by sections of industry before the situation crystallized. It was evident, however, from the first reading of these plans that they were slanted towards protecting certain groups that were very much concerned with the postwar markets in the commodities affected. It is to the credit of the disposal agencies that they did not allow themselves to be railroaded into acceptance.

An added complexity is the responsibility incurred by the Prime Contractors who in turn are responsible for myriads of Sub-Contractors. The Sub-Contractor can and does vary from the basement and alley shop manned by the owner and his family to the well integrated plants employing thousands. Therefore, the records and responses from these Sub-Contractors vary in their accuracy to the extent that many a Prime-Contractor cannot clear his books with declared surplus until he can round up his Sub-Contractors. This situation has certainly placed an added load upon the R.F.C. in compiling listings of equipment.

It is the writer's opinion that the confusion is rapidly being dissipated as the Reconstruction Finance Corporation takes over in the prevention of the duplication of effort that plagued the plan at its outset. The buyer, whether a small business man, returning G.I. or a large corporation, is treated simply as one individual intent on making a purchase. No pressure is being exerted to freeze out the small buyer; rather, the small buyer is being given preference if he will only acquaint himself with the necessary details. To those wishing to finance the purchase of this equipment, the R.F.C. certainly has a fair plan of fifteen percent down with the balance extended over a period of not more than five years at four percent interest. Any interested individual should write the Reconstruction Finance Corporation, Washington, D. C., for the pamphlet entitled "How to do business with the R.F.C." This simple booklet tells the whole story in plain language with all the details clearly set out and is not the usual maze of diction so often associated with government forms.

The securing of the information and the mastering of the necessary details comprise but the first and easiest step encountered by the prospective purchaser of machine tools. The really important step for the purchaser is for him to clearly understand the necessary

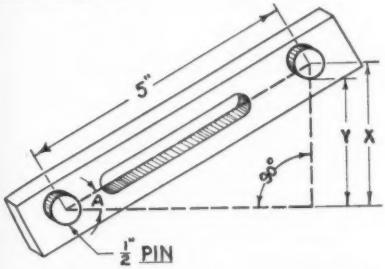
TDJ SHOP DATA SHEET NO. 8

SINE BAR: Methods and Formulas

The sine bar is a precision instrument used either for measuring angles accurately or for locating work to a given angle, usually used on surface plates or clamped to angle plates.

There are a number of types of sine bars, three of which are illustrated. All types incorporate a steel bar with parallel sides and two pins, whose center-to-center distance is either 5" or 10".

When a sine bar is set at an angle, the center-to-center distance of the pins becomes the hypotenuse of a right triangle whose base line is parallel to the surface plate.



The usual problem to be solved with the sine bar is setting it to a required angle. Having the angle given, and knowing the hypotenuse, one end of the bar must be raised a distance equal to the sine of the angle, times the center-to-center distance of the pins. This is derived from the natural trigonometric functions where:

$$\text{Sine of the angle} = \frac{\text{opposite side}}{\text{hypotenuse}}$$

In the figure above, the known quantities are: A=30°; Center-to-center of pins, 5"; Dia of pins, ½"; Radius "R" of pins, ¼"=.250". Problem: find the values of X and Y.

Substituting the known values in the above formula gives:

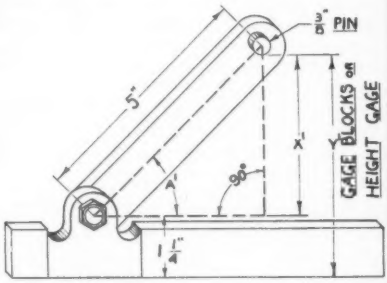
$$\text{Sin } 30° = \frac{X}{5}$$

Then X=30° x 5. (From tables of Trig. Functions sin 30°=.5)

Therefore X=.5 x 5=2.5"

Then Y=X−R=2.5"−.25"=2.25"

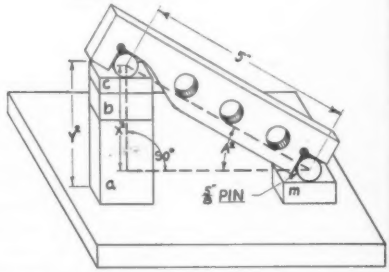
The given values for the jack knife



sine bar above are: Angle A'=45°; Pin C,C=5"; Pin dia=⅜"; Pin radius, R=$\frac{3}{16}$"=.1875". Problem: find X' & Y'.

X'=(5 x sin 45°)−.1875 (sin 45°= =(5 x .70711)−.1875 .70711)
=3.5356−.1875
=3.3481

Y'=X'+1¼
=3.3481+1.2500
=4.5981



Known values in the figure above are: Angle A'=34° 45'; Pin C,C=5"; Pin dia=⅝"; Pin radius, R=$\frac{5}{16}$"=.3125. Problem: find X' & Y'.

X'=5 x sin 34° 45' (Sin 34° 45'= =5 x .57000 .57000)
=2.850

M=.5"; R=radius of Pin=.3125

Therefore M+R=.5+.3125=.8125= height of right hand pin center above surface plate.

Y'=(M+R+X')−R
=(.5+.3125+2.850)−.3125=3.350

Gage blocks can be used equivalent to: a=2"; b=.800"; c=.550".

details associated with the item he is intent on purchasing. The factors of size, model, capacity, performance and adaptability are a few of the significant items.

The listings of the R.F.C. are taken from property records only. This information usually mentions the manufacturer's name, the machine model and type and here the information stops. Do not expect the Reconstruction Finance Corporation to provide industrial engineering service for you; they are merely disposal agencies and are not interested in the merits of the various pieces of equipment they have for sale.

For instance, assume that one wishes to purchase a high production lathe for the turning, facing, grooving and cutting-off of an aluminum casting. The selection of the lathe capacity is of course the first step. Remember, when working near the lathe capacity limit, that a twelve-inch lathe does not necessarily mean that any twelve-inch diameter workpiece can be accommodated. Reference to an adequate manufacturer's catalog is often necessary in determining just what can be done on a certain model lathe. Then too, one is familiar with the Gisholt line; will a Carbo, Fay, Potter-Johnston, Seneca Falls produce the same? They probably will, but do not expect the R.F.C. to answer the question. A ready reference such as Sweet's File Mechanical Industries published by Sweet's Catalog Service, 119 W. 40th St., New York 18, N. Y. or the new book published by the American Technical Society of Chicago, Ill., will be a great help in identifying the machines mentioned in the R.F.C. listings as to their appearance and performance. True, many a purchaser will not need these references, but the writer has certainly found them valuable when a piece of equipment is listed with which he has personally not been acquainted.

If one needs a sensitive drill press the problem is fairly simple as the chuck capacity and distance between spindle and base are known, and the chances are that such an item purchased from a listing will be satisfactory and adequate. However, a lathe or a boring machine presents a more complex problem. The machine in question may be assumed to be a standard machine and this assumption is often incorrect. The machine probably was tooled for a particular job, and such items as tailstocks, cams, tool slides, etc., are not as per that lathe if currently purchased from the maker.

Before buying such a piece of equipment, the buyer should arrange with the R.F.C. to inspect same. My advice is to include with one's toothbrush and extra shirt a pair of coveralls. The machines are crammed in warehouses and it takes a lot of climbing around to really inspect one. Here again do not expect the R.F.C. attendant to know the answers as to cams, tool slides, etc. Sometimes the electrical equipment is designated in the machine records, but it is often omitted and it behooves the purchaser to definitely determine whether the motors are for 220 volt AC or 440 volt AC. The writer found to his sad experience that it costs money to rewind motors when they were originally intended for a higher or lower voltage.

It is the writer's opinion that the purchaser should be prepared to replace bearings, clean hydraulic mechanisms, and to purchase necessary cams, followers, speed-change gears, collets, spindles, etc., for his particular application after he has purchased the piece of surplus equipment. It will only be by chance coincidence that he gets a machine to exactly fit his complete requirements.

As to special fixtures attached to the machines, they will be of no use to the new purchaser but are sometimes included in the price. A frank explanation to the R.F.C. will usually get some relief in this matter, but the purchaser should be sure he is not buying a hunk of tool steel that will be of no use to him. Again, it is not the R.F.C.'s duty to know if the jig or fixture is not a part of the machine itself. This is especially true when considering boring equipment such as Heald and Excello precision boring equipment. These machines carry the model number on the base, but the boring heads or spindles may have been changed to suit a special application and the entire function of the machine may have been adapted to a certain fixture application. A good knowledge of the characteristics of the standard heads on both of these types of machines is indispensable when making an "on the spot" inspection.

It is not the intent of these admonitions to stop the reader from purchasing surplus machine tools. They are merely

(CONTINUED ON PAGE 118)

Should Aircraft Engine Gears Be Ground?*

A study of production methods, the effect of grinding on gears and the relative effect of grinding upon the endurance limit of gears and gear tooth fatigue.

by E. A. Koether
DEVELOPMENT ENGINEER
The Norton Company

During the past several years, there has been an ever increasing demand for precision high service gears and other engine parts. Such gears, which are of minimum cross section and which will transmit great amounts of power in small spaces and which must also be highly resistant to wear and practically unbreakable, have greatly increased the difficulties of gear making.

Rejections High

Many manufacturers, not previously engaged in the aircraft industry, have started production of aircraft engines and, due to the urgent production requirements and the lack of sufficient experience with this particular precision problem, the rejections due to burns and cracks of nitrided and carburized gears after grinding were greatly excessive at the beginning of this project.

At first these rejections were blamed almost entirely upon the finish grinding operation. Burned or cracked gears still occur from time to time in varying percentages, but by improving the operations of manufacture the percentage of rejects has been reduced by a very considerable extent. Nevertheless some engineers feel that the grinding of hardened gears introduces a definite hazard and have therefore eliminated grinding on some of the lightly loaded aircraft gears.

Investigation indicates that most gear grinding troubles can usually be traced to faulty or inaccurate preparatory operations or procedures prior to grinding. There has been, and still is, a tendency to tolerate relatively large dimensional inaccuracies in the preparatory operations on aircraft gears if the gears are to be finished by grinding, because some engineers depend upon the final grinding operation to correct these inaccuracies and errors. This condition places an additional responsibility upon the gear grinding operation and has led to a great extent to the so-called "hazard" of grinding hardened aircraft engine gears.

Preparation of Gear Blanks

Gears are usually produced by the shaping, planing, hobbing or milling methods. These methods are mostly continuous and are performed on special gear cutting machines on which the cutting tool and gear blank revolve or index together and the cutter is either fed across or into the gear blank as it indexes or revolves, thus generating the involute contour of the teeth. The gear blanks must be machined accurately on all dimensions and to the proper diameter, so that the gear cutting tool can be centered properly and adjusted to cut to the correct depth of tooth. These cutting tools must also be properly designed and ground in order to assure accuracy of the involute tooth contour and to allow a uniform amount of metal for grinding. Holes must be held to very close limits and concentric with the gear diameter, and the mandrels must fit the holes accurately or the gear cannot be held rigidly or correctly for either cutting or grinding of the teeth. The gear side-faces must also be parallel and at a right angle to the holes. These are only a few of the many requirements demanded to machine precision gear teeth accurately.

*Courtesy: Grits and Grinds, The Norton Co.

Distortion During Heat Treatment

Although some shaved gears are now being produced the greatest objection to shaving aircraft engine gears is the probability of distortion and decarburization during heat treatment after the gear tooth contour has been finished. Considerable distortion, often of a non-uniform nature, particularly of carburized gears, occurs upon quenching. If heat treating procedure can be improved to cause a more uniform distortion and an allowance be made to compensate for this condition in cutting the gear originally, shaved gears to some degree at least will replace ground gears, especially where the gears are lightly loaded in use. A great deal of experimental work is being done in this direction. If the total error of the hardened gear can eventually be held to .0005" or less with practically no surface decarburization, grinding of gears may be substantially curtailed.

Machining and Grinding

After finish machining, gears are carburized to a depth of 0.030" or 0.040" per side, usually allowing 0.015" to .020" on the diameter for finish grinding. The gears are heat treated and tempered to a hardness of 60-65 C Rockwell and cleaned by various methods. The side-faces, the bore and the teeth are then ground. Some producers of gears are experimenting with the following procedure: Machine the teeth of the gear in the usual manner, but closer to the finish size; then shave for accuracy of contour, allowing .006" to .007" on the diameter for finish grinding. The gear will then be carburized, heat treated and finish ground, removing only .003" to .0035" stock per side. In order to accomplish this, distortion in heat treating and decarburization must be held to a minimum. Special heat treating fixtures and quenching dies are being developed for this purpose.

Machining Gear Teeth

Where grinding is not employed, very accurate hobs and other types of special cutters must be considered for the preliminary operations. Test data on shaved gears has been extended far enough to predict the durability of certain types of aircraft gears. Another important factor which is being considered is that the wearing down of the cutter contour is much more gradual than the wear of an abrasive wheel, therefore only periodic setups and inspections are necessary to control the form of a shave gear tooth. However, accurate machining and shaving and subsequent heat treating depend on a forging or blank that is more closely controlled for dimensional accuracy than for grinding. *If this same preparation was provided for grinding* many difficulties erroneously attributed to grinding would cease to exist. This margin in favor of grinding is not very great, because variations in the amount of metal left for grinding not only affect case depth but may cause possible burning or checking of the gear tooth surface due to excessive and non-uniform stock removal.

Shaved Gears

Many experiments have been conducted on shaved gears, but the complicated forms of non-uniform section will require more study. However, it seems to be generally agreed that shaving of certain type gears may have certain advantages provided it meets the quality and production requirements of aircraft engine gears. Distortion after heat treating is not entirely a matter of chemical analysis of the material and method of heat treatment, but also involves design and proper machining preparation of the blank.

Unless the *decarburized surface* of gears is *entirely removed* after heat treating by thorough blast cleaning, grinding may cause burning of the tooth. The decarburized surface, which is soft, has a tendency to load and dull the abrasive wheel rapidly, thereby generating sufficient heat to cause superficial surface burns. Some aircraft engineers are of the opinion that the proper steel, uniform case and heat treatment of gears, are more important than extreme tooth accuracy. If gears can be manufactured by the shaving process and the size and tooth contour maintained interchangeable, shaved teeth may be accepted as substitutes for ground teeth. *However, greater dynamic loads can be carried on accurately ground gears* than on those finished by shaving which does not provide correction of inaccuracies of tooth contour after hardening. Dynamic loads

(CONTINUED ON PAGE 122)

Protective Plastic Coatings for Precision Tools

Now that this most destructive of all wars is over, man's ingenuity may again be turned to constructive gains created under pressure of war's requirements of doing the impossible.

by R. L. Geehr
V. PRES., RILEY & GEEHR, INC.
Chicago, Ill.

One of the most serious problems confronting the armed forces was its spare parts program in getting those vital precision replacement parts to the battlefields in all parts of the world under the most extreme hazards. Climatic conditions of extreme cold on some fronts and intense tropical heat and humidity on others, poor storage facilities, lack of warehousing, rough handling, shortage of docking and lighter facilities created this great problem.

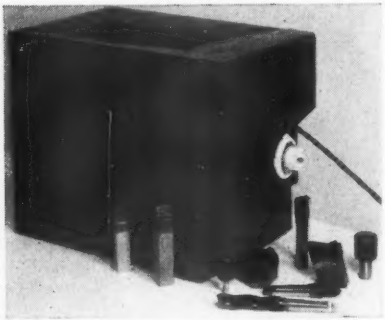
A protective thermoplastic coating was developed under rigid Government specifications to meet these problems and is now finding its way into many post-war uses in the form of protective coatings for costly precision and carbide tipped tools and gages. The protection of these tools has long been a bug-a-boo with manufacturers as well as users. Chipping, breakage and corrosion losses have been great, in both shipping and storage.

This material, as developed by the Seibert Varnish Company and known as "Tool Coat", is now available. Besides its many benefits, it is inexpensive as compared with previous methods of wrapping and preservation. Improved formulations are transparent, have greater tensile strength, are highly resistant to shock and abrasion and, as well, are non-toxic.

Although the application is simple, the proper heating equipment for the melting of this material is most important. Proper and specific heating under rigid temperature control is required, due to the high temperature range of from 350° to 375° F. for its application. Improper heating can cause phase separation and degradation of the compound thus causing it to lose its plasticity, tensile strength and protective value. Hot spots in equipment can cause charring and decomposition. Heating equipment must be thermostatically controlled and uniform in all sections of the dipping chamber. Additions of the compound must be made frequently due to the fact the vapors carry off valuable oils and plasticizers from prolonged heating.

The compound is easily applied. When melted to the proper temperature, the tool or part to be protected is cleaned and then dipped into the molten compound and removed immediately, usually allowing one second for the dip and approximately five seconds for drain. It sets up solid in approximately 30 seconds. The average coatings giving ade-

quate protection are about .0065" thick. It is then ready for shipment or storage. Should it be required that the entire tool or part be protected, a double dip method can be used whereby first one section of the part is dipped and then overlapped



with a second dip, creating a weld of the compound to itself. Another method of application is by a single dip operation in which a nylon waxed or cellophane cord has been affixed to the part or tool and the plastic is allowed to cover the part completely and travel up the non-wicking cord.

When the tool or part is to be used, the compound may be easily removed by peeling as one would a banana.

Many manufacturers of precision tools, as well as users, have already found substantial savings in the use of "Tool Coat" and current indications lead us to believe its use will be a must in peacetime industry.

Brand Names

The Brand Names Research Foundation, Inc., was organized in December, 1943, to inform the American Public through extensive research of the economic benefits to the consumer of the system of product brand identification. The Foundation aims to create leadership within industry in order to maintain the highest standards of practice among brand product manufacturers.

At a series of luncheons to be held this fall in different cities throughout the country, anniversary certificates will be awarded by the Foundation to distinguished American brand names which have been serving the American public continuously for 50 years or more.

The contributions of these brand names to the increasingly high standard of living and the American Competitive System are being recognized by the Foundation through the award of Centennial, Diamond and Golden anniversary certificates of public service. More than 300 brand names throughout the country are eligible for awards. At least 10 brand names that have served America through six generations for more than 100 years of public service are qualified. Of these, none represent the machine tool and metal working industry.

Thirty or more brands are eligible for Diamond Anniversary Certificates for 75 years of service. Elgin National Watch Co. (Watches and gages); Smith & Wesson, Inc. (Revolvers); and Nicholson File Co. (Files and rasps) are the only companies in this bracket representing the machine tool and metal working industry.

Among companies known to be eligible for 50-year awards are: Stanley Works (Tools); The Billings & Spencer Co. (Tools); Henry Disston & Sons, Inc. (Saws); The Bullard Co. (Machine Tools); E. C. Atkins & Co. (Saws); Bridgeport Brass Co. (Brass & Copper Products); Chicago Belting Co. (Belting); Miehle Printing Press & Mfg. Co. (Presses); Singer Sewing Machine Co. (Sewing Machines); Ingersoll-Rand Co. (Drills); J. A. Fay & Eagen Co. (Woodworking Machinery); Warner & Swasey Co. (Turret Lathes); Gould's Pumps, Inc. (Pumps); F. E. Myers & Bros. (Pumps); Westinghouse Air Brake Co. (Air Brakes); Colt's Patent Firearms Mfg. Co. (Firearms); Diamond Chain & Mfg. Co. (Chains); and Chain Belt Co. (Chain Equipment).

It is interesting to note that this 50-year group falls within the machine tool, builders and metal working industry.

TDJ

Goodspeed-Detroit Company, manufacturer's representative with offices at 233 Machinery Bldg., 2832 E. Grand Blvd., Detroit, Mich., will represent Young Arbor Co. of Cleveland, manufacturers of Young Roller Clutch Precision Mandrels. Clyde L. Edwards will be active on the account.

Turning Steel With Negative Rake Carbide Tools

The success experienced with negative rakes on carbide milling cutters is arousing considerable interest today in the question of whether the advantages of using negative rakes can be extended to broader fields of tool usage.

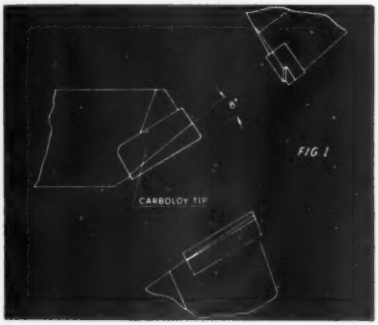


Fig. 1—Sketch of typical carbide turning tool showing double negative rakes; 5° negative back rake and 5° negative side rake.

As a matter of fact, the turning of steels with carbide tools having negative rather than positive rakes is already being utilized in many shops. During the last phases of the war, virtually all manufacturers of artillery shells employed negative rakes for some turning cuts.

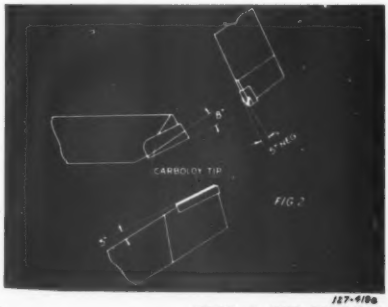
Frequently, negative rake turning of steels has been found to materially prolong life between grinds by protecting the cutting edge against chipping. This is especially true where work is eccentric; on interrupted cuts, and where an appreciable amount of scale is present.

by Carroll Edgar
DEVELOPMENT ENGINEER
Carboloy Company, Inc.

On a carbide tool, negative *back* rake protects the tool's cutting edge because any irregularities on the surface of the workpiece, scale, lugs, etc., will strike the tool in back of rather than on the nose, the "weakest" part of a carbide tool. A negative *side* rake tends to throw the chip back away from the cutting edge, warding off chipping of the carbide blank in a *longitudinal* direction. Carbide tools with negative rakes have been found to chip less readily than positive rake tools when machining work like forged shells which are usually covered with a heavy crust of scale and are frequently so eccentric that the depth of cut varies from ⅛" to ¾" per revolution.

Benefits from negative rake carbide tools are illustrated by a Michigan plant which turned out 5000 155mm shells per day over a period of many months. An average of 250 shells per grind was obtained with conventional carbide tools. When negative rakes were used, pieces per grind rose to an average of 400. Similar increases have been reported by other users of negative rake carbide turning tools. Generally, where negative rake carbide tools have been introduced because of scaly or eccentric steel pieces, their use has tended to become standard for rough machining of forgings and castings.

Fig. 2—Detailed "close-up" sketch of the chip breaker section on the tool illustrated in Figure 1 to better show the negative rakes.



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Design of Negative Rake Tools

For rough turning of steel forgings, a carbide tool having a negative back rake of 5° and a negative side rake of 5° is a generally satisfactory design (Figure 1). These angles are usually confined to the *chip breaker* rather than the entire blank (Figure 2).

Negative rake carbide tools for rough turning give even longer operation between grinds if cutting edge and nose radius are honed at a 45° angle (Figure 3). Width of chamfer thus formed should be from .005" to .010" for optimum results (Figure 4). Honing removes any "ragged" edges the cutting edge may retain from re-grinding. Honing also helps prolong the time between sharpenings by protecting the cutting edge somewhat against the "sawing" action of scale if it is present on steel. It is impossible to eliminate the effect of this "sawing action" entirely, even with carbides, since steel scale is abrasive to the point of producing a true grinding action.

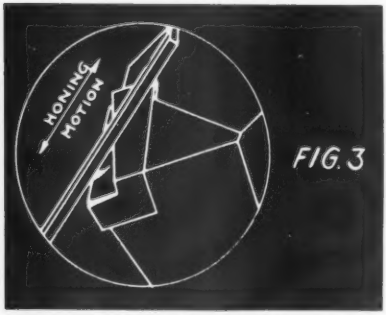


Fig. 3 — Sketch to show method of honing the cutting edge of a negative rake turning tool at 45° angle.

Nose radius proportions on a negative rake carbide turning tool generally should be the same as on positive rake tools. If the nose radius is too large, the tool will develop a tendency to chatter; if too small, the tool will break down. Relief angles on negative rake turning tools are also the same as for conventional tools, i. e., from 5° to 7° side and front relief angles.

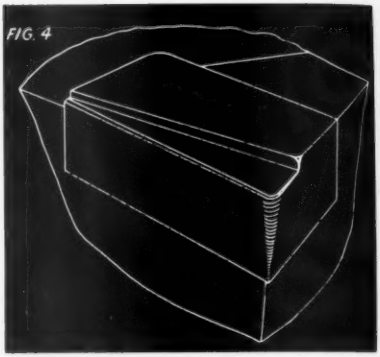


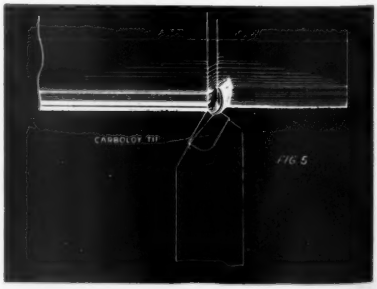
Fig. 4 — Detailed "close-up" sketch of the honed edge of the tool shown in Figure 3 to better illustrate proper width of chamfer.

Setup and Machine Considerations

In general, the nose of a negative rake tool should be set on or slightly above center line of the workpiece. Where possible, use a side cutting edge angle of 10° to 30°. This *eases* the tool into the cut and out of the work at the end of the cut, whereas a tool with a zero side cutting edge angle tends to *jump* out of the cut, a condition which can easily lead to tool breakage. Moreover, chip load per unit of length is less with such an angle than on a tool with a zero side cutting edge angle.

Optimum speeds and feeds for negative rake steel turning are usually the same as when positive rake tools are used.

Fig. 5. — Sketch showing a typical negative rake carbide tool used for taking finishing cuts on steel.



If a coolant is used on a negative rake turning job, a copius flow should be directed from the *bottom* or from *one side* of the tool so the chip will not keep the coolant away from the tool's nose. Negative rake turning of steel tends to generate more heat in the chip than does conventional turning. Some of this heat flows into the tool, as a result of which a coolant is more often needed than when machining with positive rakes.

Negative rake turning of steel also requires 10% to 15% more power than does conventional turning. Usually, no power difficulty will be experienced with any machine tool suitable for using carbide tools.

Use in Finish Turning

Although at present negative rakes are most frequently used for rough turning steel, especially forgings having a heavy crust of scale, there are some instances where negative rakes have been profitably employed for the finish turning of steel, especially on interrupted cuts. For this work, however, the edge of the tool is usually honed to a chamfer width of .003" to .005", a little beyond the depth of cut to be taken. This type of tool (Figure 5) will give somewhat increased tool life where heavy chips are not formed inasmuch as the negative rakes apparently protect the cutting edge against concentrated shock loads caused by hard spots in thin steel chips which, although invisible to the unaided eye, have been known to wreck the edge of a cutting tool.

Facing and Boring

Five degree double-negative tools are being used to a limited extent for facing and boring where the stock is rough and scaly; on interrupted cuts; or where the piece is eccentric. A facing tool with a zero back rake and a side rake between 5° negative and 10° negative has also been found to work well.

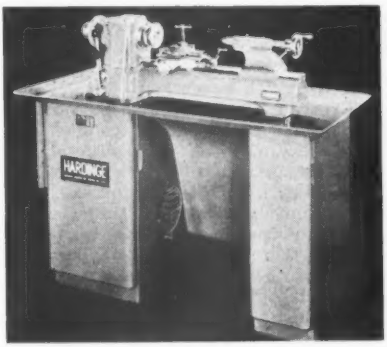
★

"Warmer" Fluorescent Lamps

Fluorescent lamps which furnish a new and warmer appearing daylight color soon will be in production, according to the Westinghouse Lamp Division, Bloomfield, N. J.

New Hardinge High Speed Precision Lathe

This new model lathe, DV59, is designed for handling work which is held to extremely close tolerances and finish specifications. The lathe bed has a three-point mounting on a welded steel pedestal base which insures original bed accuracy even when the machine is placed on an uneven floor. The fully enclosed headstock has a preloaded, ball bearing



constructed spindle which is ground to accommodate standard 1" capacity 5C Hardinge collets, and 6" capacity step chucks. Either the Hardinge standard taper or standard threaded nose is supplied for the direct application of step chuck closers, jaw chucks and face plates. The headstock spindle is driven through a center drive belt which is positioned between the spindle bearings for balanced bearing spread and equally distributed belt pull. A patented positive lock securely anchors the compound slide rest to the new improved designed dovetail bed ways and thereby affords it rapid positioning. The index slide swivels 360° and has a wear resistant, hardened and ground steel section. The dials on the feed screw are 2" dia, easily readable, and are graduated in .001". The machine's built-in electrical mechanism provides magnetic control and has time lag thermal overload relays for overload and low voltage protection. Model DV59 is made by Hardinge Brothers, Inc., Dept. TD, Elmira, N. Y.

INFORM-A-GRAM KEY No. 582-E

National Machine Tool Builders

New President of National Association urges utilizing surplus for greatest good of nation

In his first speech as president of the National Machine Tool Builders' Association, at the 44th annual meeting of the organization held in Chicago, October 22 and 23, William P. Kirk, vice president, Pratt & Whitney Division, Niles Bement Pond Co., declared that it was the responsibility of all members to assist in formulating and working for the adoption of policies covering surplus machine tool disposal that would be best not merely for the machine tool industry but for the nation as a whole.

Everyone concerned with the handling of surplus machine tools readily agrees that the problem of their disposal is of great importance to the future welfare of the nation, Mr. Kirk explained. "But," he continued, "as soon as the discussion shifts to questions of method and procedure, there are countless views, and many of them are advanced by people who just don't happen to know anything about machine tools."

Mr. Kirk outlined two basic requirements for the disposition of this surplus: speed, and the establishment by the armed services of a reserve of machine tools against a possible future emergency.

As for the first requirement, he explained that the government is committed to remove surplus machines from war contractors' plants in not less than sixty days after termination of the contract. "But simply to move them into the weather or into makeshift unheated storage sheds will result in serious deterioration. We therefore base our recommendations on the need for opening up all possible channels of disposal immediately and for making procedures just as simple as possible."

As for the establishment of a government reserve of machine tools, Mr. Kirk recalled that it took five years to provide the machine tools needed to win World War II, and urged that the country never again let itself be caught in such a state of unpreparedness.

"Even those authorities who agree with this suggestion, assume that a reserve of special machine tools, designed for war needs, is all that is needed," Mr. Kirk said. "They forget the list of 'critical' machine tools we had the greatest difficulty in furnishing in the required quantities—and it is a list of 'standard' types of machines."

One of the best uses that could be made of a large portion of the surplus modern machines, Mr. Kirk suggested, is as replacements for the more than 600,000 machine tools in the United States that are over fifteen years old and, therefore, obsolete. He proposed that an inducement be offered to owners of these old machines to scrap them, by allowing a special discount from the Clayton price for war surplus machines purchased as replacements for those scrapped.

William P. Kirk

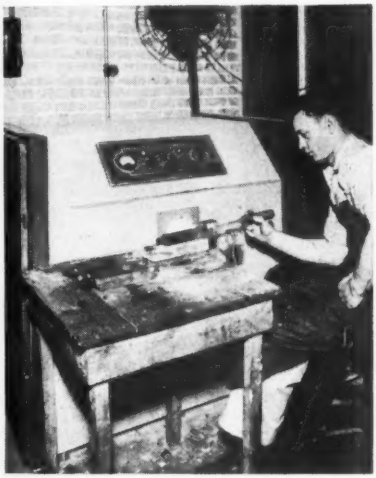
Mr. Kirk concluded by declaring: "Idle machines in warehouses are a liability and a source of expense. Put to work, they become a source of employment, they produce better consumer goods at lower costs, and they raise the standards of living."

Throughout the meeting, which was attended by executives of the majority of the machine tool manufacturers of

(CONTINUED ON PAGE 128)

INDUCTION HEATING BRAZES TOOL TIPS

Induction heating is making its place in many industrial processes because of the tremendous savings in time and consequent increase in production that is gained by its use. A recent installation at the Reed Roller Bit Company of Houston, Texas brazes alloy tool tips onto single point tools in a fraction of the time formerly required with acetylene gas torches.



A great number of tools are required at the plant, since the stock hardness of the product is approximately 350 Brinell and the tools break or dull from wear. When acetylene torches were used, the tool tip was overheated and several minutes were required to braze each piece. Tool tips can now be brazed on a 1½" x 1½" tool, which is the largest used, in about thirty seconds using induction heating. Not only is the brazing job speeded up, but the life of the tool is improved since the tungsten tip and the soft steel shank are heated at different rates and the tip does not reach the same temperature as the shank. This is evident as the power input to a magnetic material is many times greater than to a non-magnetic material with the same flux density. Most of the heat put into the tungsten tip is by conduction from the steel tool through the silver solder.

As only about one inch of the tool is in the coil, all of the power is concentrated in a small volume in a very short time. This brings the temperature of the shank to about 1400° F in thirty seconds or less on one end of the tool—depending on the size of the shank—and leaves the other end cool enough to handle with the bare hands.

The work coil for this job was designed to handle several sizes of tools without adjusting the R. F. Generator or changing the work coils. This was accomplished by designing two coils and connecting them in series. One coil consists of six turns of one-eighth inch copper tubing 2" x 2" on the inside square. The other coil also of six turns is 1½" x 2" on the inside square. With both of these coils connected to the generator in series, it was found that all sizes of tools could be heated. This method enables the operator to handle several sizes of tools without first sorting them by sizes, and therefore increases the overall flexibility.

The R. F. Generator used is a standard ten kilowatt, 450 kilocycle set. The power supply is 440 volts, 3 phase, 60 cycle. Control is by means of a "start-stop" button mounted on the face of the cabinet; additional remote control stations can be provided where required. On production work such as this where a definite time-heat cycle can be pre-determined, the automatic timer de-energizes the unit after a pre-determined time has elapsed. Protection to the generator is obtained by magnetic type overcurrent relays in the plate circuit of the rectifier and the grid circuit of the oscillator tube. The main line circuit breaker has thermal and instantaneous magnetic overload protection, and the control circuits are fused. The grid controlled 3 phase rectifier in this unit provides a flexible means for power output control to the work.

After installation and tune up, an inexperienced operator had no difficulty working with the generator and was soon very proficient in its use, both for brazing on new tips and removing those dulled by wear. As a result, the plant has experienced no tool shortage and one bottleneck in production was broken.

TOOLING THE UNIVERSAL JIG VISE

With the Universal Jig Vise, detailed in Figure 1, actual-sized layout sheets are furnished by the manufacturer. Consequently, working with a tracing paper overlay enables the tool designer to sketch in the nest and to lay out the bushing plate in a fraction of the time that would be required for a complete layout. By adopting a standard template for the anchorage screw holes, (A) Figure 2, and for the positioning dowel holes (B), any number of jobs can be tooled, using the same jig vise base. Interchangeable bushing plates, Figure 3, contribute to the versatility of the Universal Jig Vise. Shifting from one job to another is simple, easy and takes only a few minutes. The bushing plates are made of cold rolled, low carbon machine steel. Extra plates, ready for laying out, are available at a nominal price. The jig can be converted from right to left hand operation, Figure 4, in less than a minute by simply loosening a set screw and shifting the actuating handle to the left end of the cam shaft. This change does not require removing the vise from the machine table or bed. When working soft or brittle alloys, thin-section pieces, or plastics, one of the most appreciated features of this production tool is the ease with which its clamping pressure can be adjusted and controlled. This is effected by simply raising or lowering the position of the bushing plate to a point where the maximum desired pressure is reached just short of dead center.

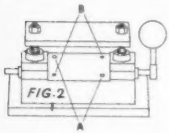


FIG. 2

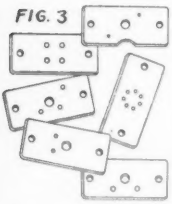


FIG. 3

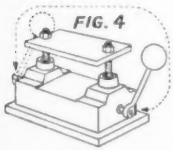


FIG. 4

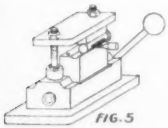


FIG. 5

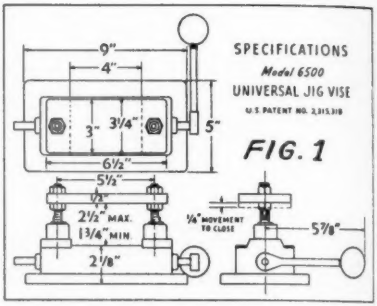


FIG. 1

At dead center any further travel of the ball lever only serves to relieve the clamping pressure on the workpiece, making crushing impossible. Figure 5 shows the simplicity of the vise for quick tooling, speed of production and accuracy of finished work. The end of the nest acts as a stop for the round workpiece which required a very accurate key slot.

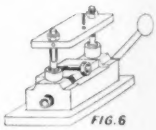


FIG. 6

The job was performed perfectly without the use of steadying set screws. In Figure 6 is shown a setup for drilling a hole in the collar of a screw machine product. The nest, a piece of flat stock with a V groove, positions the work and the edge of the nest serves as the stop. Figure 7 shows an ingenious use of a collet in a milling operation. An ordinary collet is passed through a sleeve in the bushing plate and is threaded into the nest plate. When the workpiece is placed in the collet, raising the vise handle causes the bushing plate sleeve to close the collet around the work thus holding it for the slotting operation.

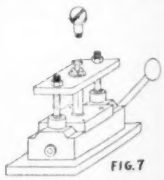


FIG. 7

The Universal Jig Vise is nationally distributed by J. M. Short & Associates, 53 W. Jackson Blvd., Chicago 4, Ill.

INFORM-A-GRAM KEY No. F43-E

MULTIPLE-SPLINE AND HEX SOCKET SCREWS

The Multiple-Spline has become recognized by design engineers as a superior method of transmitting rotary power, as is exemplified in its application in many modern, highly-developed machines, such as the propeller hub of the airplane and the transmission shaft, drive pinion shaft, and rear axle of the automobile. The Bristol Company has taken advantage of this sound engineering principle in the development of their Bristo socket set and socket head cap screws, which have the strength for the most difficult applications, a reality which holds true down to the smallest size manufactured; a No. 4 set screw with .112" dia. body. These screws will not round out nor will the socket wall break, because there are no spreading forces or expanding pressures exerted on the walls of the socket.

There is no chance for the key to slip and mar the surrounding surface, because the Bristo screws take the wrench without fumbling or skidding.

Because of the multiple-spline design it is practical to make Bristo set screws and cap screws in sizes as small as No. 4 wire size. Manufacturers of small precision equipment and products, some of which are subject to considerable vibration, such as electric razors, sewing machines, X-ray machines, tabulating and computing machines, stock market tickers, cameras, postage meters, scientific instruments and vending machines, have standardized on Bristo screws. In spite of their minute physical proportions they can be "set up" tightly, so that vibration will not loosen them, and they can be removed without socket damage.

Bristo Multiple-Spline Socket Screws are offered in a wide variety of special shapes and forms. Since the multiple-spline socket permits the transmission of greater turning force without damage to the screw, almost any shape or kind of screw required for a particular application can be furnished. Screws of unusual design or of soft, light-weight alloys are exceedingly practical for the reason that the Bristo socket is not as dependent on the strength of the material as other socket designs.

These screws can be made, both in standard and special design, of mild and stainless steel not heat treated, aluminum, brass, Monel, Everdur, Beryllium Copper, and other similar materials.

Bristol's Hex Socket set and cap screws are headed by a patented process so designed that the socket in the head is shaped by extrusion with the metal under compression, thus guarding against the danger of internal fractures which may occur where the metal is under tension during the forming operation. The screws are normalized after each step of the process and heat treated in a series of automatically-controlled furnaces to obtain the correct balance of hardness and toughness.

For further description of the Bristo screws write The Bristol Company, Dept. TJ, Mill Supply Division, Waterbury 91, Conn., or use our postage free

INFORM-A-GRAM KEY No. F29-B

. . . IN PERSON

HARLEY W. WHITMORE was recently appointed chief engineer of the Deepfreeze Division of Motor Products Corp., North Chicago, Illinois.

ROBERT J. HARPER, director of design, New York, and C. STOW MYERS, same responsibility in Los Angeles, former associates, are taken into partnership with WALTER DORWIN TEAGUE, Industrial Designer, with offices in New York and Los Angeles.

GEORGE J. CALLOS is elected vice-president and account executive of the Klau-Van Pieterson-Dunlap Associates, Milwaukee, advertising agency. Mr. Callos was advertising and public relations manager of Allis-Chalmers.

W. E. STADEL and **M. W. WOODRUFF** are added to the engineering staff of the George L. Nankervis Co., Detroit, manufacturers and distributors of plating and metal finishing equipment.

DR. TAYLOR LYMAN is editor of the A.S.M. Metals Handbook according to an announcement by W. H. EISENMAN, national secretary of the American Society for Metals, Cleveland.

C. B. COLE, 24 South Pulaski Rd., Chicago 24, Ill.—Chicago and Wisconsin; ERNEST W. NELSON, 201 Hoover Drive, Syracuse, N. Y.—Rochester and Buffalo; J. W. BILLET, 3664 Agnes Ave., Lynwood, Calif.—Southern California, are appointed sales representatives in the area named by the Acromatic Tool Co., Detroit, manufacturers of tungsten carbide cutting tools.

O. M. HULLINGER is appointed manager of the Chicago office of the Elastic Stop Nut Corp. of America. He was with the Line Material Co. where he was manager of transformer sales.

ROBERT H. BOYER is appointed sales engineer by The Osborn Mfg. Co., Cleveland. He will assist Osborn salesmen in studies of the application and use of power brushes.

Burnell O. Burritt, hydraulic engineer, is on the engineering staff of Craftsman Tool and Die Co., Detroit. He will be in charge of the development of new lines of hydraulically-operated production equipment.

E. L. Stacy, southern Texas representative for Federal Products Corp., manufacturers of dial indicators and dial indicator gages, is now located in a permanent office at 718 Leeland Ave., Houston 2, Texas. Office space has been difficult to find in Houston.

Edward de Luca, industrial engineer, is associated with the Machine & Tool Designing Co., Philadelphia, as field representative in the south. Headquarters, 1716 Landon St., Jacksonville, Fla.

Cecil Hopkins is now advertising director and **Rommie F. Simmons, Jr.,** assistant advertising director of the newly formed advertising and public relations department at Briggs Clarifier Co., Washington, D. C.

P. D. DeLeo, development engineer; **I. A. Crawford,** research engineer; and **E. Y. Bunting,** machine design engineer, are new appointees in the enlarged engineering staff at Progressive Welder Co., Detroit.

William C. Van Cleaf, director of industrial relations; **Arthur R. Tofte,** manager of advertising and public relations department; **R. N. Landreth,** assistant to the vice-president of the general machinery division are recent appointees at Allis-Chalmers, Milwaukee.

William J. Chovanec, formerly of the engineering staff at the Cleveland Automatic Machine Co., is now district sales manager for the Cincinnati territory.

Donald D. Dilworth, former account executive of Kenyon and Eckhardt, New York advertising agency, is on the staff of Klau-van-Pieterson-Dunlap Associates, Inc., Milwaukee.

Joseph S. Lederer has withdrawn as a partner from the American Photocopy Equipment Co., not Inc., as of September 1, 1945.

Russel G. Curtis is works manager of United Cinephone Corporation, Torrington, Conn. He has a background of eighteen years devoted to manufacturing and management engineering.

Floyd Rose, formerly president of Vanadium-Alloys Steel Co., is the new chairman of the board of Firth-Sterling Steel Co., McKeesport, Pa. Firth-Sterling will add more melting and rolling units to its mill facilities as well as expand the research and metallurgical departments.

Wayne Brinkerhoff, formerly manager of Technical Data Service at Goodrich, Akron, is now advertising manager, B. F. Goodrich Chemical Co., Cleveland. He will manage the advertising and sales promotion for all the company's products which include Geon polyvinyl materials, reclaimed rubber and various chemicals.

BAROMETER OF GOOD TIMES . . .

Bell System's $2,000,000,000 postwar construction program includes the purchase of 20 acres of land near Allentown, Pa., on which will be constructed a new electronic components plant for **Western Electric.** The office building will have 50,000 sq ft of floor space and the manufacturing building 250,000. Full air conditioning will be installed. The **Austin Co.** will be architects and engineers.

Westinghouse has opened a new laboratory, in Los Angeles, to which all western industry may bring for study its problems of speeding peacetime production by making use of the newest scientific methods of high frequency heating. In charge of the laboratory is **Dr. Russell A. Nielsen,** formerly of the company's Research Laboratories in East Pittsburgh, Pa.

The D & H Distributing Co., Inc., Harrisburg, Pa., with branches in Williamsport, Pa. and Baltimore, Md., is now distributor for the **American Central Mfg. Corp.,** Connersville, Ind., manufacturers of the American kitchen line of all-steel sinks, wall and base cabinets.

The Osborn Mfg. Co., Cleveland, sees a brighter outlook for American business south of the border, since the return of **M. L. Langel,** head of the export department, from Mexico, where he visited the industrial sections of the country to determine the possibilities for power brushing uses in industry.

Arrowhead Rubber Company, Los Angeles, is seeking a new manufacturing site to consolidate its facilities under one roof. The company has been turning out molded rubber products and Airton, the new glass-rubber material, in five different plant locations. A minimum space of 50,000 sq ft is required. Extensive purchases of new rubber machinery is now being made, including a large Banbury, a special machine for compound mixing.

Buick Motors, with a dealer organization geared to deliver more than 300,000 new cars at retail during the next 12 months, will handle Buick's ultimate capacity of upwards of 550,000 cars annually with relatively little change in numerical strength.

Lockheed Aircraft Corp., Burbank, Calif., has orders booked for 103 Constellation Transports amounting to $75,500,000 and conditional orders for two new type planes, approximating $46,300,000. The Constellations will go to eight major airlines with routes reaching every major country on every continent.

General Motors is planning to build two new automobile plants in Cleveland at an expenditure of $27,000,000.

Western Electric is negotiating a lease for the government owned Studebaker Plant in Chicago to augment the manufacturing facilities of the company's Hawthorne Works.

William A. Thompson, principle partner of **Toolcraft Products Company,** Dayton, Ohio, has started construction of a $35,000 two-story brick addition to the firm's plant. Toolcraft builds dies, jigs, fixtures, tools and special machinery.

Westinghouse is negotiating the purchase of five acres of land, and five major buildings, with more than 100,000 feet of floor space from **Talon, Inc.,** Meadville, Pa. Industrial heating equipment will be produced requiring the employment of 150 to 200 persons. Departments will be moved from East Pittsburgh and Mansfield, Ohio.

International Detroit Corp. has sold its Indianapolis machine tool plant and equipment. Production and servicing of Libby Turret Lathes has been transferred to the company's Elkhart, Indiana, plant. **F. L. Jacobs Company,** Detroit, was the purchaser.

F. L. Jacobs Company, Detroit, auto parts and accessories manufacturers, will build the "Launderall" washing machine and a new vending-cooler for Coca-Cola bottles at their recently purchased plant in Indianapolis.

Garco Machinery Company, Cleveland, is now representative for **Gerotor May Corp.,** manufacturers of Gerotor air and hydraulic valves and cylinders and hydraulic pumps. Garco will cover the Cleveland territory.

Ace Abrasive Laboratories, 1 Spruce Street, New York 7, N. Y. responding to increased demand for lapping and super-finishing knowledge, are enlarging the scope of their activities in anticipation of a greatly increased demand for close-tolerance production. Their new service and engineering units will furnish advice to manufacturers on the solving of lapping and super-finish problems. They will make available, generally, the information and know-how in the speeding up of production and improvement of surface finishes acquired in their vast wartime activity with Star Dust Diamond Powders and Lapping Compounds.

Washington Steel Corp., a recently formed company, has purchased the plant and facilities of the **Washington Tin Plate Company,** Washington, Pa. Stainless steel in both sheet and strip form will be produced in the gage range of .004" to .078", and up to 36" wide. The plant will be completely equipped with new and improved machinery designed and laid out specifically for the production of stainless steel.

Hercules Powder Company, Wilmington, Del., will spend $30,000,000 on a postwar construction program to be completed in three years. The largest of the company's expansion will be in the Cellulose Products Department to increase production of various cellulose derivatives used by the lacquer, plastics, rayon and other industries.

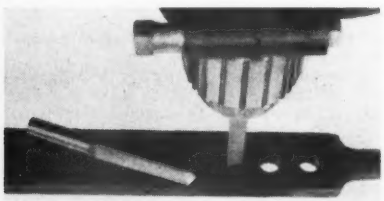
Drilling Hardened Steels

by F. G. Gepfert
PRESIDENT, BLACK INDUSTRIES
Cleveland, Ohio

Four years ago a new type of drill was developed and put into production for the purpose of drilling hardened steels—steels which could not be drilled with a high speed steel drill. They have been found ideal for drilling carburized, oil-hardened, water-hardened, cyanided and nitrided steels of 40 Rockwell "C" and higher hardness. The use of the *Hardsteel* drill eliminates annealing, re-machining, re-hardening, loss of many hardened parts, time and costly handling. It has been a boon to the war industries of the allied nations for the last four years because it has helped speed production of badly needed hardened machined parts requiring drilling, countersinking and counterboring operations.

Hardsteel drills differ in both shape and material from the conventional and familiar twist drill. The shank is round but the working part of the drill is triangular in shape with small grooves at the point to provide chip clearance. The point is ground to the shape of a pyramid with a normal drilling angle of 59° (Figure 1). This angle may be changed to suit special countersinking needs. For flat bottom drilling and counterboring, the point may be ground flat (Figure 2).

Fig. 1—With a standard *Hardsteel* drill, it is easy to drill right through an ordinary shop file.



With this drill, cutting action takes place only at the tip. The principle is not one of cutting away metal. Frictional heat at the tip, generated by speed and pressure, anneals the hardened metal under the drill tip and the drill scrapes out the softened material, leaving a highly burnished hole surface. Hole size is held to within one or two thousandths of an inch.

One of the most outstanding applications of the use of *Hardsteel* drills is in the aircraft engine field. In one department of the Buick plant, oil-holes are drilled through the connecting-rod bearing surfaces of the crankshaft of the Pratt & Whitney duplex engine. Regular automotive procedure involved spot-drilling through a bushing after carburizing, but before case-hardening. However, it was found that the throws and adjacent parts became distorted to a certain extent, in some instances causing the spot-drilling to form a definite ellipse.

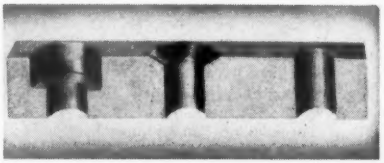


Fig. 2—This unretouched photograph shows a block of hardened steel split through the center to expose the clean cut surface of the holes and the unchanged character of the metal around the holes after drilling, countersinking and counterboring the block with *Hardsteel* drills. Note fracture of block.

Analysis of this problem led to the conclusion that the cause lay in the breaking of the surface with the spot-drill before hardening. For this reason it was necessary to change the entire drilling procedure, which had been based on former standard automotive manufacturing practice.

The new practice involved the carburizing and case-hardening of the medium carbon high-alloy crankshafts before spot-drilling. The shaft is placed in a specially designed fixture and is then put into position in a drill press, the throws being held in a vertical plane (Figure 3). A ⅜" *Hardsteel* drill with a 60° included angle is then fed into the piece through a guide bushing. The drill revolves at a speed of 1800 rpm and a hand feed is used. The drill penetrates the piece until the diameter of the hole is about $\frac{1}{10}$".

Two spot-drillings are made in line and the fixture is then inverted and two more spot-drillings are made diametrically opposite. The shaft is then realigned in another fixture with the throws in a horizontal plane (Figure 4). A single hole is spot-drilled in the center of each bearing surface at a point 90° around the circumference from the other holes.

Next a single spindle drill press is used to bring the diameter of the finished spot to a predetermined size which is checked by gaging (Figure 5).

After the hardened bearing surface has been penetrated by a *Hardsteel* drill, a high speed twist drill is used to complete the hole by drilling through the soft core to the hollow center. This operation is done in the same drill press with the same setup except that a proper size bushing is substituted.

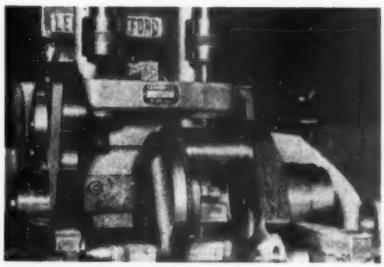


Fig. 3—Using a *Hardsteel* drill for spot-drilling oil-holes in the hardened steel crankpins of a Pratt & Whitney twin-engine crankshaft, with the throws in a vertical position.

Since the change to this new procedure, after several months there were no rejects from off-position spot-drilling. The parts moved much faster to vitally needed aircraft engines and man-hours formerly spent on prior operations were saved. It is estimated that with the *Hardsteel* drills forty to fifty spot-drillings were made per grind, with twenty grinds per drill, indicating an extremely low cost per drilling.

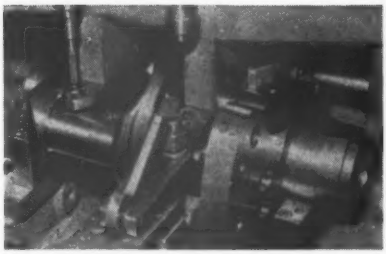
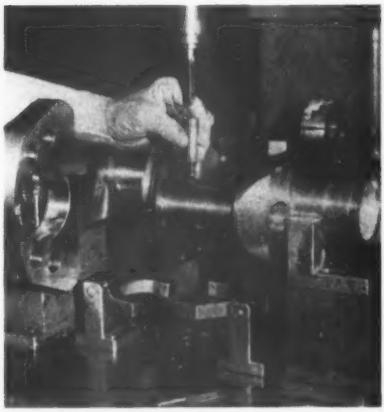


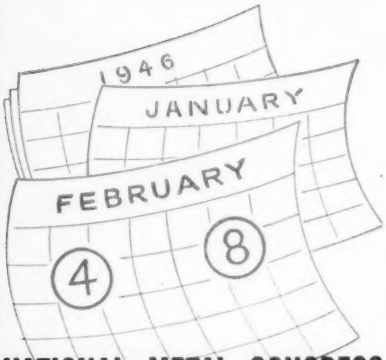
Fig. 4—An operation similar to that shown in Figure 3, being performed with the crankshaft throws in a horizontal position.

Another outstanding example of *Hardsteel* drilling occurred in the Packard plant where Rolls Royce aircraft engines were manufactured, involving the drilling and reaming of camshafts of SAE 4620 steel. Original plans called for drilling and reaming before hardening, but the hardening process created

(CONTINUED ON PAGE 114)

Fig. 5—Gaging the final diameter of the "Spot". Constant checking maintains precision at all points.





NATIONAL METAL CONGRESS

February 4-8, 1946

National Metal Exposition, Public Auditorium, Cleveland (for information, address W. H. Eisenman, Secretary, American Society for Metals, 7301 Euclid Avenue, Cleveland 3, Ohio).

February 4-8, 1946

National Metal Congress, Public Auditorium, Cleveland, participating societies —American Society for Metals, American Welding Society, Iron and Steel and Institute of Metals divisions, American Institute of Mining and Metallurgical Engineers, and the American Industrial Radium and X-Ray Society.

February 4-8, 1946

Postponed 1945 annual convention, American Society for Metals, Cleveland —Statler Hotel.

February 6-8, 1946

Postponed annual convention, American Industrial Radium and X-Ray Society, Cleveland—Hollenden Hotel.

February 4-7, 1946

National meeting, American Welding Society, Cleveland—Hotel Cleveland (for information, address Miss M. M. Kelly, Secretary, 33 W. 39th St., N. Y.).

February 4-8, 1946

National meeting, Iron and Steel and Institute of Metals Divisions, American Institute of Mining and Metallurgical Engineers, Cleveland—Statler Hotel (for information, Address Frank Sisco, Assistant Secretary, 29 W. 39th St., New York City, N. Y.).

TECHNICAL

27th NATIONAL METAL EXPOSITION

Plans have been completed for the first great postwar industrial show with the announcement of the 27th National Metal Exposition to be held in Cleveland's Public Auditorium from Monday, February 4, through Friday, February 8th, 1946. Originally scheduled for October of this year, the event was moved up to February to avoid any interference with heavy wartime transportation demands, according to W. H. Eisenman, managing director of the Exposition and national secretary of the American Society for Metals, sponsor of the event.

The metal show will be held in conjunction with the National Metal Congress. Cooperating with the American Society for Metals in presenting the Metal Congress will be the American Welding Society, the Iron and Steel and Institute of Metals divisions of the American Institute of Mining and Metallurgical Engineers, and the American Industrial Radium and X-Ray Society.

SAE MEETINGS TO CONSIDER PEACETIME APPLICATION OF WAR ENGINEERING PROGRESS

Peacetime applications of wartime developments in automotive engineering are to be outlined at national meetings shortly to be resumed by the Society of Automotive Engineers after interruption during the war.

National meetings schedule, announced by SAE General Manager John A. C. Warner, include:

November 6 and 7, SAE National Fuels & Lubricants Meeting, Mayo Hotel, Tulsa, Okla.

December 3 to 5, SAE National Air Transport Engineering Meeting, Edgewater Beach Hotel, Chicago, Ill.

January 7 to 11, 1946, SAE Annual Meeting and Engineering Display, Book-Cadillac Hotel, Detroit, Mich.

KNOW-HOW MEETINGS

April 3 to 5, 1946, SAE National Aeronautic Meeting, Hotel New Yorker, New York.

Completion of the 1946 schedule awaits action by SAE Council during the Society's Annual Meeting at Detroit in January, but tentative plans provide for a full program which includes the SAE Summer Meeting. The Summer Meetings were cancelled in recent years to permit SAE members to devote full time to the SAE War Engineering Program.

During the war, SAE national meetings were replaced by local war emergency meetings which, sponsored by SAE Sections, maintained the SAE service of disseminating pertinent engineering information.

ASTE APRIL EXPOSITION

The American Society of Tool Engineers Exposition will be held in Cleveland, Ohio, April 8 to 12, inclusive, according to an announcement by the Board of Directors of the American Society of Tool Engineers at the October semi-annual meeting in Detroit. Arrangements have been made for the use of the Cleveland Public Auditorium and it is planned to use the entire quarter of a million square feet of space thus available.

This will be the fifth such exhibit of production equipment and processes held by the Society and the first major postwar show featuring machine tools, materials handling and control equipment, cutting tools and production processes.

The annual meeting of the American Society of Tool Engineers will be held in conjunction with the Exposition and a series of technical sessions will be scheduled. A complete floor plan of exhibit space is being mailed to all former exhibitors and other copies may be obtained from ASTE headquarters, Penobscot Building, Detroit 26, Michigan. The floor plan is simple and every space is easily accessible.

The show is being designed with major attention to its educational and informative value for all engaged in the field of production. Aside from machines and tools, the show is planned to include all types of materials for fabrication, materials handling equipment, drafting room supplies and tools, machines and devices for determining costs of production and job evaluation, coolants and lubricants, gages of many kinds, control devices of pneumatic, hydraulic electrical and electronic design, as well as other tools and devices necessary to turn raw materials into finished products. Because of the importance of delivering finished products to the ultimate user in good condition, space will be devoted also to exhibits dealing with methods and materials for packaging such products.

Arrangements made with Cleveland Hotels indicate that an adequate number of rooms will be available for exhibitors and their representatives as well as for those who will attend the exposition.

AMERICAN ARBITRATION ASSOCIATION

The importance of Trade Associations in the commercial developments of the postwar period is signalized by the recent appointment of Arthur M. East as Director of Arbitration Service and Charles F. O'Brien as Director of the Labor-Management Division of the American Arbitration Association.

The strengthening of the Arbitration Association's executive staff is in recognition of the enlarged responsibility that voluntary arbitration will have to carry in the transition period. Both labor and management, in ever increasing numbers, during the war period, have been making use of the facilities the association has built up throughout the country. With the imminent dissolution of the War Labor Board and the reluctance of both groups to submit to a continuance of Government direction in labor relations, future demands on the association are expected to increase.

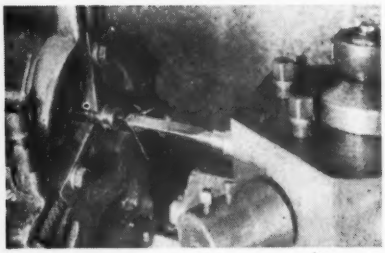


Fig. 6—Close-up view of *Hardsteel* triangular-shaped drill used to start hole in hardened end of Rolls-Royce camshaft.

distortion in the piece and necessitated a long and costly straightening operation after hardening.

By the use of *Hardsteel* drills it was possible to drill and ream after hardening, thereby eliminating the distortion and subsequent straightening process. A turret lathe was used for this operation with the piece mounted in the chuck of the machine and held at the other end by a steady-rest (Figure 6). The overall length of the piece was about 36 inches.

A ⅝" taper shank *Hardsteel* drill was used and mounted in the turret. The piece revolved at a speed of 750 rpm and the drill fed into the end of the work by the automatic feed (Figure 7). A generous flow of soda-water is the coolant and the drill fed to a depth of about ¼", which is well below the depth of the hardened surface. The pieces are then rifle-drilled and reamed to the desired diameter. No guide bushings are necessary because center holes had been drilled for prior machining operations.

This new method has resulted in substantial improvements in the quality of the work and much lower scrap loss. Overall costs have been reduced considerably and much larger production has been gained.

In addition to these specific cases, thousands of valuable dies, jigs, and fixture parts have been salvaged. Sometimes workmen neglect to drill for a locating pin or miss a drilling operation as laid down in the specifications. Sometimes engineering changes call for a new hole or a change in hole location. These errors and changes are easily taken care of, after the pieces have been hardened and finish ground, with *Hardsteel* drills which also eliminate the processes of annealing and remachining. A vast amount of saving has been made in this way in man-hours and in getting the pieces into the production line for vitally needed materials.

Another vauable application for the metal *Hardsteel* has been found in the cutting tool field. This superior nonferrous alloy has been found to be particularly adaptable to "middle range" machining applications. Because of its exceptionally high red hardness, it is possible to take very heavy cuts at faster speeds than have been possible heretofore. It is particularly adaptable to heavy roughing cuts and is able to cut heavy scale at much faster speeds with considerably lower tool wear. It is also an ideal tool for intermittent cutting operations.

Hardsteel cutting tools can be used on any modern machine; lathe, planer, automatic screw machine, etc., that has sufficient spindle speed to overcome the tool load at increased speeds and feeds. It is equally effective on all types of steel, iron, copper, bronze, brass, aluminum and other metals. Due to its high resistance to abrasive wear, it does a particularly fine cutting job on non-ferrous metals.

An outstanding performance of *Hardsteel* cutting tools occurred at a plant manufacturing lock nuts for aircraft.

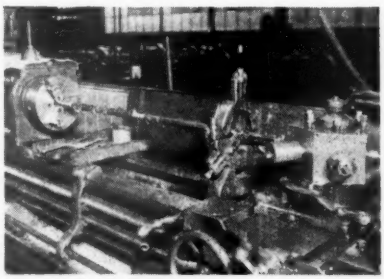
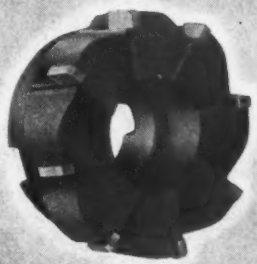


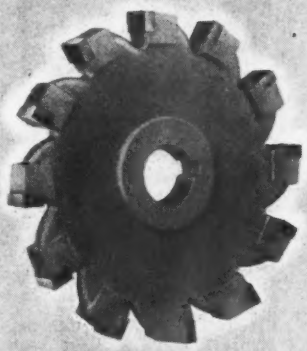
Fig. 7—Drilling the hardened end of a Rolls-Royce camshaft preliminary to rifle-drilling. A speed of 700 rpm is used.

This operation was set up on an automatic screw machine. Material used was 21/32" diameter bar stock of X-1350 steel. The problem here was to meet excessively high production quotas and

(CONTINUED ON PAGE 116)

Here's NEWS!





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THE Cooper-Bessemer CORPORATION

Dept. J, Mount Vernon, Ohio
Industrial Tool Division

COOPER-BESSEMERS CUT THE COST OF CUTTING

to eliminate the down time for grinding the ordinary cutting tools which had been used in this operation.

The *Hardsteel* tool used on this operation was ⅜" square, taking a depth of cut of $\frac{1}{16}$", the feed being .010" at 1050 rpm. The tools were ground with a side

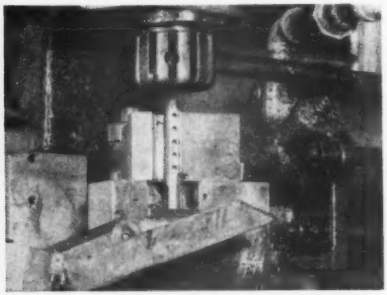

Fig. 8—Vertical spinning machine operating at 2000 rpm with *Hardsteel* die spins shut 720 Admiralty Bronze fuse cases every hour.

clearance angle of 6°, front clearance angle 6°, side rake 4°, and 0 back rake. This tool was used for the roughing operation and at the above speeds and feeds this plant produced an average of 2400 pieces per day per machine, requiring only one grind per day, as against an average of 2 hours per grind with the previously used tools.

An excellent cutting job was also accomplished by *Hardsteel* on ⅞" hex stock of SAE 4130 in the manufacture of fittings for aircraft. In this operation it was necessary to overcome the violent shock set up by the hexagon shape of the material in addition to the natural difficulties caused by the composition of this particular steel.

Two *Hardsteel* tool bits were used, one ¾" square, and one ½" square, in a Warner and Swasey No. 4 turret lathe. With the ¾" bit, a plunge cut was taken to a diameter of ½" and with the ½" tool a plunge cut was taken simultaneously to a diameter of ⅜". The work was turned at 350 rpm and by the use of *Hardsteel* cutting tools production was increased from 15 pieces per grind to 84 pieces per grind.

Another valuable use of *Hardsteel* has recently been developed in cold spinning dies, particularly when used on non-ferrous metals. Due to the needs of the allied nations for artillery and rocket shell ammunition it was imperative that tools be developed which would out-perform anything else used previously.

Hardsteel spinning dies quickly proved themselves in this type of service at a plant manufacturing primer caps for 75 mm artillery shells and rocket shells.

A *Hardsteel* cold spinning die (Figure 9) 1" in diameter by ⅝" high with a .540" cavity was inserted in a holder on the spindle of an ordinary drill press (Figure 8). The cap was made of half hard brass which was approximately 4" in length. It was necessary to completely fuse one end of this cap to a depth of approximately ¼". The piece was inserted in an air vise and automatically fed into the die turning at 2000 rpm.

Loading and unloading of this piece was done by hand and no lubricant was used on the die or work. Time per piece was approximately 5 seconds, 2 seconds for spinning and 3 seconds for handling, resulting in a minimum of 720 pieces per hour. With *Hardsteel* dies it was possible to carry on this operation for 48 hours between grinds whereas with tool steel the best life between grinds was ten hours.

Hardsteel dies gave 15 grinds before becoming too thin for additional operation whereas with tool steel dies a maximum of six grinds per die was obtained. This resulted in far less down time for grinding, and with *Hardsteel* dies an average of 750,000 pieces per die were made as against a total of 125,000 with tool steel dies.

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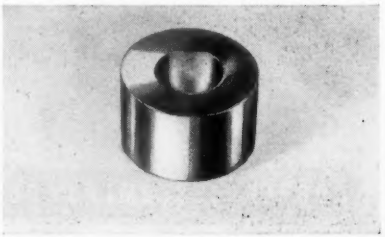
Fig. 9—*Hardsteel* spinning die used with machine shown in Figure 8, where the extreme resistance to wear and frictional heat of the metal *Hardsteel* makes its use extremely economical.



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(CONTINUED FROM PAGE 96)
made to acquaint the reader that he is not buying a newly tooled up machine from the machine tool manufacturer, and accompanied by the usual expert demonstrator from the factory. He is buying a good, although used, machine tool for a sacrifice price and must be prepared to spend a little more money than the purchase price before he can place it in production as a new tool.

The writer has seen many of these surplus tools in operation, and with a new coat of paint and the few alterations mentioned they are not distinguishable from a new machine either in appearance or performance.

The purchase price as figured by the "Clayton Formula" is to the writer's opinion very fair. It may be modified from time to time to suit the situation as it changes, but to the average purchaser it is a very equitable presentation of a plan to dispose of surplus materials. A table showing the percentages charged for machine tools based upon period of use in their original installation is included at the end of this article. The base price is the one recorded by the certifying agency at the time of purchase and is very consistent with the value of the new machine tool as purchased from the manufacturer.

After the purchaser files his name with his nearest district agency of the R.F.C. he will begin to receive the regular listings of items offered for sale. However, it would facilitate matters for both the purchaser and the agency if he would forward in triplicate a complete listing of the items in which he is interested. This listing should be classified as to types of machine tools desired. For instance, under Turret Lathes:

(1) Warner & Swasey No. 4 Universal 2" bar capacty, 18" swing.
(1) South Bend Series 1000 precision, 1" collet capacity, 10" swing.
(1) Gisholt No. 5 Universal, Ram Type, 2½" collet capacity, 19" swing.

If at any time the list becomes obsolete, changes should be forwarded in triplicate to the original agency contacted. This pertains particularly to items in which you are no longer interested. It will save many needless hours of detail for both the agency and other purchasers, because the item they are holding for you, and which is no longer wanted, may be of vital interest to some other purchaser.

If at all possible, a personal call upon your nearest agency will permit the purchaser to become acquainted with the workings of the agency and the personnel in charge of the various breakdowns of equipment. This personal contact will oftentimes save much needless correspondence and will clear up details not easy to put down on paper. It also allows the purchaser to be up to date on new pieces of equipment that become available between compilation of the printed listings. The writer does not feel he is "sticking his neck out too far" to extend this invitation of a personal call on the R.F.C. agency in your district as he feels that the agencies are more than anxious to dispose of the equipment and facilitate reconversion.

Sometimes it is possible to view machine tools on the floor of the plants where they were originally installed. This is the ideal situation as one can readily see what care has been taken of the machinery and ofttimes what was manufactured on the equipment. There is a great difference between the conditions of two 1942 IMP lathes when one was used twenty-four hours per day on iron castings and the other on the high precision brass work of bomb sights for an eight-hour day. As yet, the writer does not know that the R.F.C. can make up a price differential as to these two machines, but it is certainly evident that the machine used on brass and on high precision work is the better machine and will need fewer repairs or replacements to place it in first class condition.

The prospective purchaser, when considering new production lines, ofttimes needs other equipment than standard general purpose machine tools. In the past such pieces of surplus equipment as hydraulic presses, electric and arc welders were not figured on the "Clayton Formula" but were priced at what was termed O.P.A. ceiling. The prices ascribed under the O.P.A. ceiling were not nearly as attractive as the ones figured under the formula. In fact they were so close to the price of new equipment that the only inducement to buy seemed that of immediately securing the equipment. However, it has come to the writer's attention that now the sys-

(CONTINUED ON PAGE 120)

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Detail No. 9 — Button Die for blanking outside diameter of washer.

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Detail No. 8 — Knockout to remove washer from die.

Detail No. 19 — Stripper Bushing to strip stock from compound.

You save the cost of complete new dies when you own Hovis Master Washer Dies. Each die is made on an all-steel precision standard die set, and comes complete with stock gauges and stops .... From these dies you can remove five small interchangeable parts without dismantling the die.

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tem has been modified to include additional items of equipment.

Consequently, press brakes, bending machines, hydraulic and mechanical presses, shearing and punching machines, forging machines, wire forming machines, thread rolling machines, tube rolling machines, sheet metal machines, electric and arc welding equipment, physical property testing machines including X-ray and magnetic, riveting machines, woodworking lathes and jointers, wood veneer and plywood machines, foundry moulding machines, die casting machines and foundry coremaking machines are now being figured under the "Clayton Formula".

This is some relief, but the writer cannot see why such items as electric induction hardening furnaces, Homo-Carb furnaces and pot furnaces are not included in the aforementioned listing. They are as much a standard production machine as is the lathe or forging machine. Perhaps some reader may convince the R.F.C. that they belong on the list.

In conclusion the writer wishes to state that, all-in-all, the Reconstruction Finance Corporation is doing a mighty good job in getting the program of selling surplus tooling under way. Mr. W. Stuart Symington, surplus property administrator, knows his business and is rapidly cutting the political red-tape in order to place his agency on a business for business basis. The old waiting period designated under SPB Regulation No. 1, has been abrogated as this provision is no longer necessary to protect the small purchaser as there evidently will be an over supply of all items of interest.

Surplus War Property Administration Price Formula Applicable to Standard General-Purpose Machine Tools and Appurtenances

(See War Department Procurement Regulation No. 7-301.3 and Navy Department Property Disposition Directive No. 5)

The original price, computed f.o.b. the plant of the manufacturer is to be used as the base.

The sale price is determined by applying the percentage listed below to the original price, computed f.o.b. the manufacturer's plant.

The percentage appearing in Column B shall be applied where the buyer is the person who is using the machine tool at the time of sale or, if the machine tool is then idle, the person who last used it.

The percentage appearing in Column A shall be applied where the sale is to any other buyer.

PERIOD OF ACTIVE USE	PERCENTAGE OF ORIGINAL COST		PERIOD OF ACTIVE USE	PERCENTAGE OF ORIGINAL COST	
	A	B		A	B
Less than 1 Month	85.0%	90.0%	19 Months	58.8%	63.8%
1 Month	82.5%	87.5%	20 Months	58.0%	63.0%
2 Months	80.0%	85.0%	21 Months	57.2%	62.2%
3 Months	77.5%	82.5%	22 Months	56.4%	61.4%
4 Months	75.0%	80.0%	23 Months	55.6%	60.6%
5 Months	72.5%	77.5%	24 Months	54.8%	59.8%
6 Months	70.0%	75.0%	25 Months	54.0%	59.0%
7 Months	69.0%	74.0%	26 Months	53.2%	58.2%
8 Months	68.0%	73.0%	27 Months	52.4%	57.4%
9 Months	67.0%	72.0%	28 Months	51.6%	56.6%
10 Months	66.0%	71.0%	29 Months	50.8%	55.8%
11 Months	65.2%	70.2%	30 Months	50.0%	55.0%
12 Months	64.4%	69.4%	31 Months	49.2%	54.2%
13 Months	63.6%	68.6%	32 Months	48.4%	53.4%
14 Months	62.8%	67.8%	33 Months	47.6%	52.6%
15 Months	62.0%	67.0%	34 Months	46.8%	51.8%
16 Months	61.2%	66.2%	35 Months	46.0%	51.0%
17 Months	60.4%	65.4%	36 Months (or more)	45.2%	50.2%
18 Months	59.6%	64.6%			

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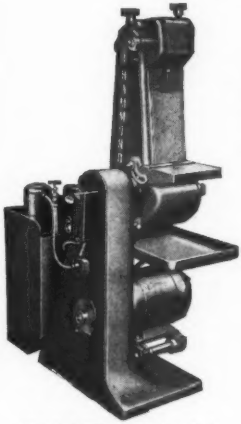
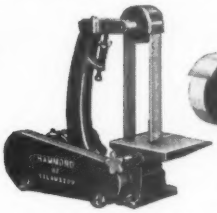
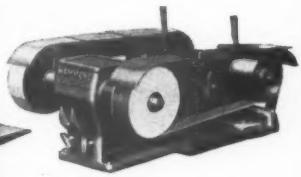


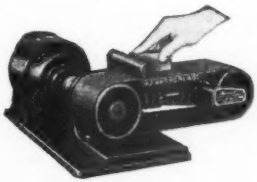
Model VH-6 Wet-n-Dri —6" belts. For Grinding, polishing flat surfaces. Operates in Vertical or Horizontal positions.



Model F-2 Flexible Belts — UP to 2" belts. For grinding and polishing cams, dies, radii, flat and irregular shapes.



Model No. 5, Dri Only —Up to 3" belts. For grinding, polishing, deburring. Grinds faster and cooler.



Model 400 Wet-n-Dri— 4" belts. For grinding, polishing flat surfaces.

CARBIDE TOOL GRINDERS

10" Wet and Dry Carbide Tool Grinder — Wet and Dry Models. For two 10" cup wheels or one cup wheel and one straight wheel.

Hammond Machinery Builders INC

1631 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

EASTERN BRANCH: 71 WEST 23rd ST., NEW YORK 10, N.Y.

(CONTINUED FROM PAGE 98)

are the maximum momentary loads set up by operating or dynamic conditions which usually are the result of deformation or other errors between contacting tooth surfaces. A few ten thousandths increase in deformation or error may also add greatly to the force of impact. High temperatures at the surfaces of the teeth may lower the resistance of the material to surface fatigue and also cause superficial cracking. In addition, the nature of the load, the strength of the gear tooth as a cantilever beam to resist breaking or the heat of operation may also limit the load capacity of any hardened gear drive.

Gear Tooth Loads—Average and Shock

The actual loads on the mating teeth of gears are not steady and uniform but are a series of impulses of varying intensities. The transmitted load is the average load. Even with perfect gears, the tooth load is not uniform. The materials are elastic and there is always some deformation of the gear teeth under load. As a result, each entering pair of tooth profiles picks up its share of the load with some shock.

When errors are present in tooth form or spacing, the intensities of these shock loads become greater with an increase in the error. Tests indicate that the extent of these errors is the primary factor; the nature of the error itself seems to make but little difference. A study of gear tooth load cycles will show that both at very low speeds and at very high speeds the extreme accuracy of the gears play but a little part. *But between these two extremes, the accuracy of the gears is a most important factor.*

Cracked Gears

Cracked gears are usually thoroughly investigated by the manufacturer to determine the possible cause, so that necessary corrections in machining, heat treatment or grinding can be made. Many gears are also given an additional hot oil treatment at 350° F. for several hours before or immediately after the final grinding operation to further relieve the stresses due to hardening or previous rough grinding. Another method which helps to eliminate cracking is to avoid excessive stock removal in the bottom of the roots of the teeth by grinding. This is accomplished by machining the gear with special gear cutters or protuberance hobs allowing sufficient clearance to blend the gear tooth profile with the root fillet by grinding, but without actually grinding the bottom of the gear tooth root. Although this is an improvement, it is difficult to properly blend the curvature of the teeth with the unground root radii. Honing, polishing or abrasive blasting of unground gear roots to remove any decarburized surface is also extremely important.

Importance of Grinding Wheel

The proper selection of grinding wheels is extremely important because soft wheels which cut freely and which reduce the danger of burning may not hold their edge sufficiently to correctly blend the radii of curvature of the teeth with the root fillet. Hard wheels hold their edge better, grind the contour more accurately and with a finer surface finish, but have a tendency to burn the gear teeth and thus cause minute surface cracks, which may result in fatigue failure of the gear under actual service conditions. Therefore, in order to select the proper wheels with characteristics which will give the proper grinding results, this subject should be carefully studied with competent grinding engineers.

Control Stresses

Stress analysis determines the direction of the magnitude of the forces in material under stress. Fatigue tests indicate physically, under given loads and conditions, how the stresses affect service life. Cracks in gear teeth that are found directly after grinding and are due to burning usually occur near the roots, but seldom in the root bottom where the appearance of burning actually shows up. The reason for this condition is that the burned area causes an abrupt reversal of the outer surface stress, with the most highly stressed points near the border line of the burn (heat checking). This condition also occurs where intricate parts are selectively carburized and hardened; crackage takes place upon severe quenching, usually on the highly carburized case at sharp corners, holes or very thin cross sections. Too high carbon content may

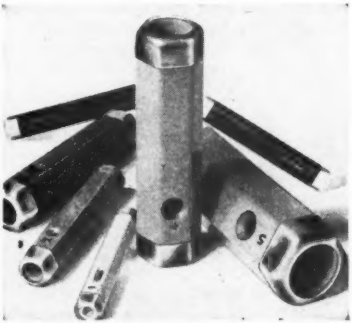
(CONTINUED ON PAGE 124)

FEDERAL

Taperlock Plastic

GAGE HANDLES

Made of durable plastic material, one-third lighter than aluminum. This lightness permits a most sensitive "touch" with less fatigue . . . an advantage appreciated by women inspectors.



Federal Taperlock Plastic Gage Handles have proved very satisfactory for glass gages. Being so much lighter than metal handles, the danger of chipping and breaking is greatly reduced.

Plastic Handles insulate, protecting gages from bodily heat which might affect accuracy.

Easily marked for identification with the same tools used for marking metal handles. Available in SEVEN sizes—00 for small gages, 0, 1, 2, 3, 4 and 5. In FOUR colors — Red, Green, Yellow and Black.

IMMEDIATE DELIVERY
On Rated Orders

FEDERAL TOOL CORPORATION

400 NORTH LEAVITT STREET — CHICAGO 12, ILLINOIS

(CONTINUED FROM PAGE 122)

cause case embrittlement, requiring a change in heat treatment and additional tempering prior to grinding. A double heat treatment to develop the best possible structure for case and core of some gear steels is highly desirable.

Cracking of the top surface of the metal renders it useless as a load carrying medium. In order to insure ample lubrication of the mating tooth surfaces, very heavily loaded gears are now being ground to 30-45 micro-inch rms surface finishes, which helps to prevent the plastic flow of the material caused by high momentary temperatures, thus greatly reducing possible scuffing, scoring and seizing of the highly loaded gear tooth surfaces. Lightly loaded aircraft gears may be produced with much finer surface finishes.

Carburized Parts

Carburized parts are fatigue resistant because through hardening treatment, the strength of the outer carburized layer is highly stressed in compression.

The average depth of carburized layer is approximately .040". If all preceding operations have been properly performed and the piece of hardened material is properly ground without generating much heat, then the stress reversal of the outer surface layer should not penetrate beyond a depth of .0005" to .0015" which is only a small portion of total carburized layer in compressive stress. However, we must bear in mind that this outer surface layer can be made softer, weaker and more ductile than it was in the pre-ground state and that the outer skin will have less strength to resist plastic deformation and bending stresses, if excessive heat is generated by improper grinding procedure. A crack usually starts under shearing stress within the crystalline grains which make up a piece of metal and occur in a minute area of the plastically deformed surface. Such a crack may spread causing eventual fatigue failure of the gear.

Although it is evident by reviewing this article that the accuracy of all manufacturing operations of hardened aircraft engine gears are important, interchangeability and precision with maximum resistance to the intensities of various tooth loads can only be achieved by the final grinding of gears.

(CONTINUED FROM PAGE 116)

Hardsteel roller dies for spinning rivets have also demonstrated their effectiveness over other materials used in the past. At a local plant manufacturing a thread protector for rocket shells, the process involved spinning the ends of the handle attached to the protector.

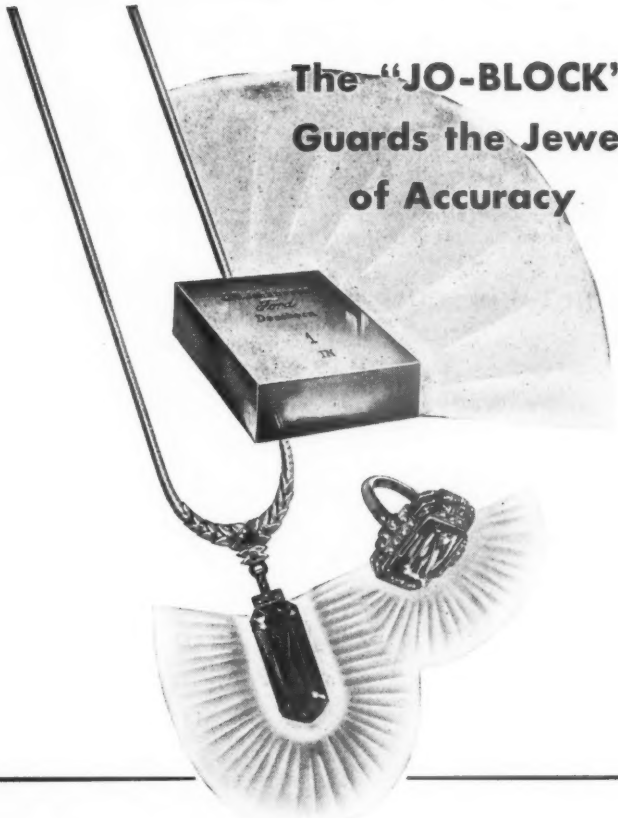
Two drill presses were set up horizontally on either side of this piece, the handle being inserted in a holder while the operation was completed. The roller dies were mounted in tool holders which, in turn, were inserted in the spindles of the drill presses. Hand feed was used and the spindle speed of the drill press was 2000 rpm.

The problem in this instance was to overcome galling in the dies. This galling condition was so bad with ordinary tools that a maximum of only 1200 to 1500 could be completed before it was necessary to remove the dies either for regrinding or replacement. Due to the high abrasion resistance of *Hardsteel*, a minimum of 45,000 pieces was completed per set of dies. This figure was reached with no regrinding and consequently no loss of time in the completion of very critical parts.

Through the entire program of using *Hardsteel* tools one of the outstanding features is the fact that this material can be ground with any type of ordinary grinding wheel, no special equipment being necessary from the standpoint of either grinding wheels or fixtures.

Hardsteel as a material has proved itself in the drilling of hardened materials and the cutting of many hard-to-machine metals. It has served well as tipping material on the work support blade of centerless grinders, as long-lasting material in spinning dies, and in accurately cast rubber molding dies.

Whenever ordinary tool steel will not operate at a profit, my suggestion to tool design and production engineers is to let the research engineers of Black Industries work with you, as they are continually doing with others, to help solve your particular problem.



The "JO-BLOCK" Guards the Jewel of Accuracy

Right now, with the long-hoped-for post-war battle for business getting into full swing, the establishment of high standards of shop accuracy becomes all-important in thousands of plants.

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Don't let the hurry of reconversion sidetrack this basic precaution. Protect the performance of your product—make assembly easier—provide parts interchangeability—with genuine Ford Johansson Gage Blocks.

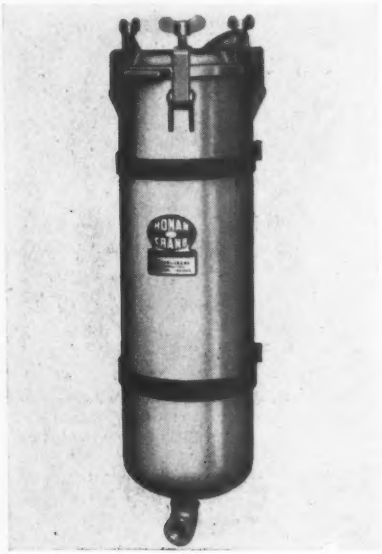
Guaranteed accurate within .000002, .000004 or .000008 of an inch, plus or minus. Available in sets or individual blocks, with all accessories needed to establish and maintain true accuracy in your plant. Write for new Catalog No. 17 today.

Ford Motor Company, Johansson Division, Dept. 1511, Dearborn, Michigan.

Johansson GAGE BLOCKS

Oil Clarifier

An oil clarifier that will remove 95 to 98% of all chips, abrasives and other solid contamination from oils and coolants used in machine tool operations has been announced by Honan-Crane Corportation. These "T" type clarifiers function continuously, assuring a constant flow of clean oil or coolant to the machine tools at virtually no operating cost. The cycle of operation is automatic except for the short periods required to remove accumulated abrasives from the cotton tubing or to replace new tubing



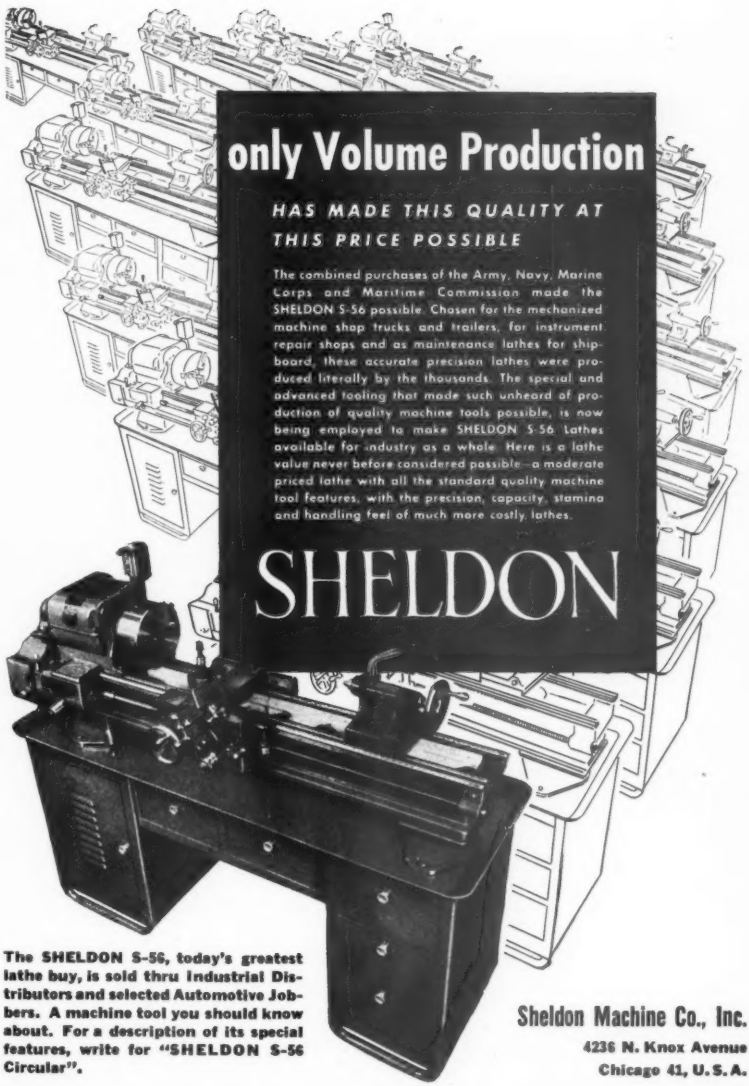
when necessary. The operation of the clarifier is quite simple. The dirty oil or coolant enters the clarifier at the bottom, surrounds the many filter tubes which have been covered with a closely woven cotton filter tubing, it then passes through the cotton cloth and filter screens, and from there rises to the clean oil outlet and thence to the operating equipment served. The removal of dirt and abrasives from oils and coolants will eliminate, in many cases, the outbreak of skin infections; lengthen the life of tools and thus reduce the time lost in grinding tools and dressing stones; allow a better finish on products; cut rejections to a minimum; permit more continuous operation of machines and extend the life of the oil used indefinitely. These clarifiers are built in two models. The "T-4" is designed to serve a single machine and connects directly to the oil system, utilizing the oil pressure of the equipment pumps. The "T-8" model is equipped with its own motor-driven pump and operates independently of the equipment's system, being connected with the sump. It is capable of handling the oils and coolants from two or more machine tools. Complete specifications and engineering bulletins on purification of all types of industrial oils and coolants may be obtained by writing to Honan-Crane Corporation, Dept. TJ, 208 Indianapolis Ave., Lebanon, Indiana.

INFORM-A-GRAM KEY No. 322-E

"Liquid Honing"

"Liquid honing", or vapor blasting, as it is variously called, is a method of putting highly polished or super-smooth finishes on metal parts. The process is based upon the use of a very fine abrasive in a chemical emulsion which is discharged by compressed air against the surface to be finished in a manner similar to sand blasting. The abrasive action of the emulsion gives a finely polished finish to any part being blasted. This finishing method was invented about two years ago and the proficiency of its results led to its use in the finishing of aircraft propellers, intricate shell parts, dental drills, and other military equipment early in 1944. Engineers of the Battelle Memorial Institute are investigating the uses and limitations of this technique and will attempt refinements and development of better control methods in its use. Further particulars may be obtained from the Vapor Blast Manufacturing Company, Dept. T-6, Milwaukee, Wis.

INFORM-A-GRAM KEY No. F51-E



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HAS MADE THIS QUALITY AT THIS PRICE POSSIBLE

The combined purchases of the Army, Navy, Marine Corps and Maritime Commission made the SHELDON S-56 possible. Chosen for the mechanized machine shop trucks and trailers, for instrument repair shops and as maintenance lathes for shipboard, these accurate precision lathes were produced literally by the thousands. The special and advanced tooling that made such unheard of production of quality machine tools possible, is now being employed to make SHELDON S-56 Lathes available for industry as a whole. Here is a lathe value never before considered possible—a moderate priced lathe with all the standard quality machine tool features, with the precision, capacity, stamina and handling feel of much more costly lathes.

SHELDON

The SHELDON S-56, today's greatest lathe buy, is sold thru Industrial Distributors and selected Automotive Jobbers. A machine tool you should know about. For a description of its special features, write for "SHELDON S-56 Circular".

Sheldon Machine Co., Inc.
4236 N. Knox Avenue
Chicago 41, U. S. A.

(CONTINUED FROM PAGE 104)

the country, it was continually emphasized that insofar as a company, by the aid of good machine tools and other productive equipment, can lower the cost of its product, it can offer the product at a lower price, and that lower prices mean greater sales volume and more jobs.

In enlarging upon this basic phase of the economics of the American principle of volume production, Joseph L. Trecker, vice president of Kearney & Trecker Corporation and retiring president of the Association stated that inevitably as the price of a desirable product goes down, more people can buy it, so its potential market increases. As the market increases the sales volume of the product, of course, goes up. And as the volume goes up, the manufacturer can afford to hire more men. That, Mr. Trecker explained, is how more jobs are created and how good machine tools can help to create them.

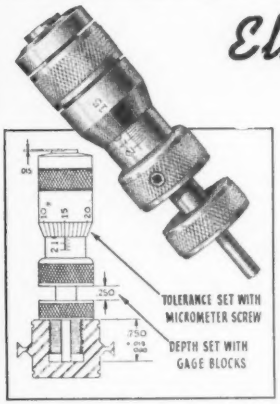
Mr. Trecker urged that if every member would seize every opportunity to drive home this truth, it wouldn't be long before the public would become conscious of the fact that machine tools were just as important in peace as in war.

Another outstanding feature of the meeting was a discussion by George H. Johnson, president, Gisholt Machine Tool Company, of his observations in Germany, which he recently visited as a member of the Reparations Commission.

Describing his impressions of the metalworking capacity in that country, Mr. Johnson said: "I think I can best sum the situation up in this single statement: When the war ended, Germany, in spite of all the bombing of its industrial plants, still had left, in repairable condition, relatively more machine tools than we at this moment have in the entire United States of America.

"And when I say machine tools, I mean modern and new machine tools. The German machine tools are good.

"You may be amazed, as of course I was, at the proportion of the German industrial machines that remain operative and undamaged in spite of all the air raids. We estimate not over 15% were damaged beyond reasonably simple repair."



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with the New

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FLUSH PIN GAGE

An accurate flush pin depth gage, quickly adjustable for hundreds of uses and various types of parts. Besides the numerous combinations possible with each pin (3 sizes are furnished) extra anvils are available so that it may be used for depth gaging almost any part. Tolerances are adjustable on the Micrometer screw from plus or minus .000 to .200. Gage is simple, easy to set and locks firmly. It will save money for you.

Open territory available for manufacturers' representatives.

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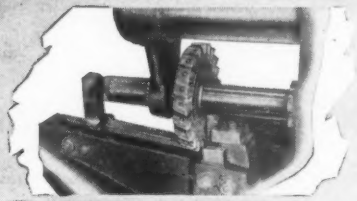
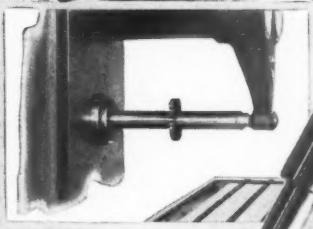
Milwaukee ARBORS

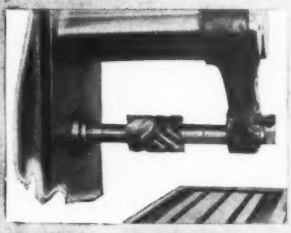
STANDARDIZED AND INTERCHANGEABLE
. . . FOR ALL STANDARD MILLING MACHINES



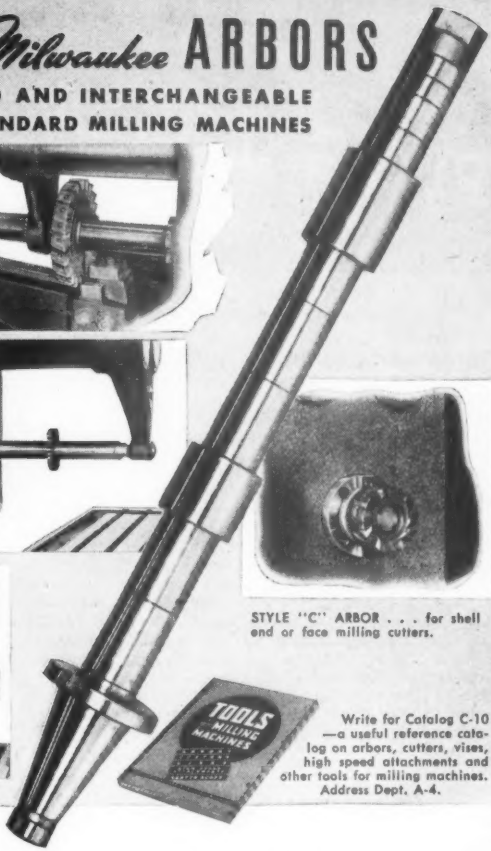
STYLE "B" ARBOR . . . for heavy cuts. Wide selections of lengths and diameters for any required operation.



STYLE "A" ARBOR . . . normally used on light cuts. Pilot end provides maximum clearance between arbor and workpiece or holding-fixture.



STYLE "C" ARBOR . . . for shell end or face milling cutters.



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A good arbor is essential to get the best in performance from your milling machines.

Milwaukee arbors are precision tools — their use provides milling accuracy, long arbor and cutter life, profitable performance.

You can use Milwaukee arbors on any standard milling machine in your plant, equipped with a National Standard Spindle End. Write for Catalog C-10.

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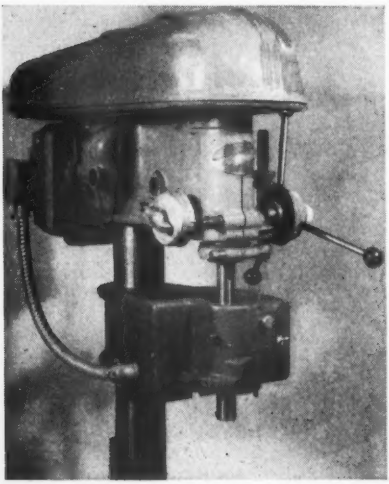
TAPPING ATTACHMENT. Douglas Machinery Co. has announced the development of a new model Rotorex Precision Tapping Attachment which is applicable to all popular model drill presses and gives Class III threads with unskilled labor in 0-80 to ⅞" sizes. The new Rotorex provides positive, automatic control of lead to assure precision tapping, as well as accurate control of depth to a tolerance of .010". Lead screws are hardened and precision ground, well lubricated and fully enclosed for protection from dirt. Other features include instantaneous emergency reverse, complete automatic cycle and foot control which leaves operator's hands free for loading. Complete installation can be made in ½ hour or less. Changeover from tapping to drilling or vice versa can be made in five minutes. The attachment requires little more vertical space than the ordinary tapping chuck and is simple in construction and operation. Catalog and complete details will be sent by DOUGLAS MACHINERY CO., 150 Broadway, Dept. TJ-11, New York 7, N. Y.

INFORM-A-GRAM KEY No. 586-E



COUNTERBORE SET. CS-1H identifies the set of four adjustable counterbore-spotfacers with exceptional cutting range which has been announced by the ROBERT H. CLARK CO., 9330 Santa Monica Blvd., Dept. TDJ, Beverly Hills, Calif. The four tools, which collectively will cut any fractional or decimal diameter within ¼" to 1⅜" O.D., come in the following sizes: Model No. 43B-H with a cutting range from 1" to 1⅜" O.D.; No. 42B-H ranging from ¾" to 1"; No. 41B-H—$\frac{9}{16}$" to ¾";

and No. 40B-H cuts from ¼" to $\frac{9}{16}$" O.D. Holes may be counterbored to any depth. A cross-lip or shoulder prevents burrs from forming around the edge of the pilot hole and eliminates galling and binding. The pilots are hardened and ground and high-speed steel blades can be easily sharpened or replaced. The complete Clark CS-1H Set—four counterbores and an assortment of 11 extra pilots—is mounted in a wood crib box. The Robert H. Clark Co. will send further details.

INFORM-A-GRAM KEY No. 92-E

HOW TO INCREASE THE Speed OF 2-STEP DRILLING

Oil-Hole Subland Drills Are The Answer!

Because oil-hole subland drills have cutting edges that are always kept cool by a constant stream of oil, they permit much faster drilling than ordinary subland drills.

This is why their use is increasing by leaps and bounds in shops that are seeking new methods of reducing production costs. By increasing the daily output of a machine, they pay their cost in a remarkably short time.

Made to Specifications!

All sizes from ½" to 3½" in diameter and up to 36" overall. Please specify taper or straight shank. We also specialize in the manufacture of all types of subland drills and reamers.

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Special Reamers

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Straight Shank Subland Oil-Hole Drill

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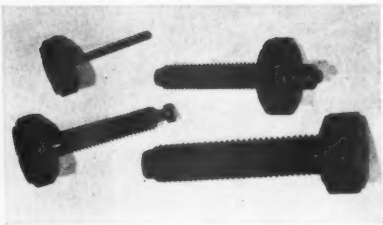

INDUSTRIAL STRAINER. For use with turret lathes, screw machines, grinders and other machine tools which require a cutting oil or coolant flow, Strainer Products Corp. produce a precision-engineered, non-clogging industrial strainer, The Metex Unit. With its capacity for holding great amounts of dirt, chips and grit, and easily installed strainer refills which decrease required maintenance time, The Metex Unit facilitates practically uninterrupted machine operation. Metal cuttings and chips are so well prevented from lodging in the pump that its periodic shutting down for cleaning and repairs is seldom required. By preventing the recirculation of foreign matter in the coolant fluid, Metex Units minimize the output of poor finishes, scored parts, and other defectives. The "Straincoed" fluid used adds life to the cutting oil, decreases tool wear and often disposes of need for lapping.

Strainco-Metex Units are made of fabric and wire strands knitted into a honeycomb construction, resulting in non-collapsible mesh strainers which provide a high capacity and unequalled strainage area. Types, sizes, and capacities to suit every machine tool are available in Strainco-Metex Units, which are installed rapidly and easily in the machine tool sump tank or in a separate tank on the pump intake. The units are made by STRAINER PRODUCTS CORPORATION, Dept. TD, 75-77 North Willow St., Montclair, N. J.

INFORM-A-GRAM KEY No. F21-E

TORQUE THUMB SCREWS, designed to replace the usual "Spring Jack" and to exert a predetermined pressure, are being produced by the Vlier Mfg. Co. They afford proper support and prevent overclamping which results in the perfect alignment of holes and surfaces, thereby reducing scrap through the elimination of distortion. When the screw contacts and supports the part, the ratchet knob continues to turn without advancing the screw. Various sizes of screws, from No. 6 to ⅝", present maximum end pressures of from 5 to 22 lbs. These screws are made with either regular end thrust, inverted, or for use with sliding V-blocks. All screws are hardened and have a rust-proof finish.

Further information and literature on request from VLIER MANUFACTURING CO., Dept. TJ, 4552 Beverly Blvd., Los Angeles 4, Calif.

INFORM-A-GRAM KEY No. E51-E

ELECTRONIC PRESSURE SENSITIVE DEVICE. Converting gas or liquid pressure to electrical energy for measuring, recording or controlling is accomplished by means of the SR-4 Pressure Sensitive Device.

The instrument heart is a very fine filament wire bonded to a hollow metal core against which is exerted the gas or liquid pressure being measured. The increase of such pressure causes filament stretch thus changing the wire diameter and creating measurable

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The Finest!

Chicago Standard Screw Products are manufactured from finer materials and are unsurpassed for their increased strength, greater accuracy and perfect uniformity. In your present plans for increased production—try "Chicago Screw"—manufacturers of precision-made Standard Screw Products.

These Fine Products are sold only thru Authorized Distributors

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PROGRESS ON PARADE

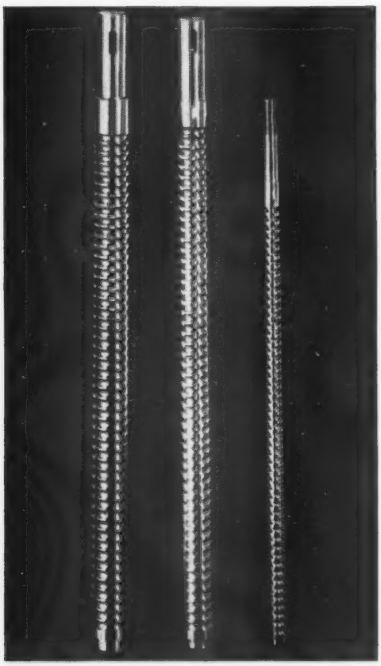
changes in the wire's electrical resistance. Such changes vary the amount of current flowing through the filament circuit and, when amplified, either appear on the dial or actuate a control system. The SR-4 is hermetically sealed with a built-in compensator for canceling the effect of any such extraneous force as temperature. This Pressure Sensitive Device is sized 1" in diameter and 5½" long while its accuracy for measuring to ¼ of 1% of full scale renders it useful for heretofore impossible control operations. The available models of the SR-4 have several measuring ranges, the highest being 0 to 20,000 lbs psi.

Metal core "stretch" of no more than .000001" affects the filament of the SR-4. It is actuated by the very "breathing" of the metal to accomplish measurement of pressure changes without physical movement. The results obtained by this device can be transmitted, even by radio, for long distance direct reading, recording or control. The SR-4 Pressure Sensitive Device is made by the BALDWIN LOCOMOTIVE WORKS' SOUTHWARK DIV., Dept. TD, Pascal Sta. P. O., Philadelphia 42, Pa.

INFORM-A-GRAM KEY No. 131.5-E

WORK-LITES, which are attachable to machine tools, assembly benches, desks, etc., are introduced by SWIVELIER CO., Dept. TDJ, 30 Irving Place, New York 3, N. Y. Work-Lites are grounded by direct connection to the outlet box or transformer and are available with: Arms from 12" to 30" long; Cone, Bell, Parabola or Acorn shades; and with or without a removable glass lens (frosted, clear or daylight). Vibration or any amount of adjusting will not loosen the stay-put Work-Lite due to its SWIVELIER socket which is universally adjustable, spring constructed like the base and arm assembly. They render the Work-Lite entire arm universally adjustable. Lack of wing-nuts or set screws to tighten makes the Work-Lite easy to adjust and completely covered wires assure its safety. Further information, contained in catalog No. 111, will be gladly sent upon request.

INFORM-A-GRAM KEY No. 439-E



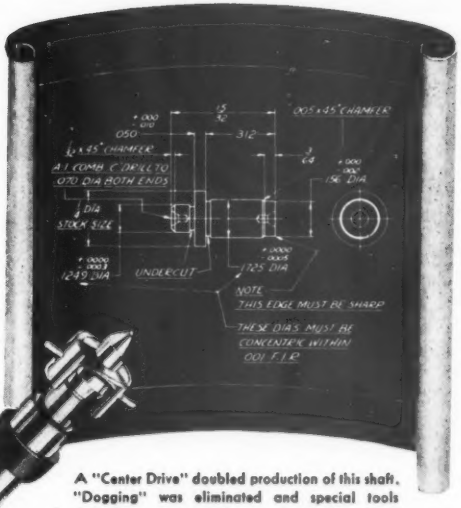
BROACHES. To insure the desired results with Zagar 20" Horizontal and 10" Vertical Hydraulic Broaching Machines, Zagar Tool, Inc., is now making broaches.

Illustrated here are three of their typical broaches including: No. 1 (left), a 6-spline broach of 1½" in diameter at its widest point; No. 2 (center), a conventional key slot model; No. 3 (right), a threaded end broach for use with the Zagar, quick action, broach holder. They represent the largest hole broaching capacity of the 20" Zagar Horizontal Broaching Machine.

Inquiries may be addressed to C. W. Wolf, Sales Manager, ZAGAR TOOL, INC., Dept. TD, 23880 Lakeland Blvd., Cleveland 17, Ohio, or use our postage free

INFORM-A-GRAM KEY No. 650-E

Cut CYLINDRICAL GRINDING COSTS



A "Center Drive" doubled production of this shaft. "Dogging" was eliminated and special tools shaped proper step and groove in grinding wheel to entire piece was ground in one operation. Tolerances were held to .00003, with approximately 2% rejections on first run of 36,732 pieces.

Replace headstock dead center with a "CENTER DRIVE". "Center Drive" *eliminates "dogs" to hold and drive work.* It becomes integral part of work — rotates it between dead centers — enables both ends, or different diameters, contours, angles and radii to be ground in one grinding plunge.

Closest tolerances can be held and perfect concentricity obtained with practically no rejections. A "Center Drive" more than DOUBLES PRODUCTION — saves own cost on first production run. AVAILABLE NOW!

IF YOU are troubled with a difficult cylindrical grinding job, let us *prove* what a "Center Drive" can do.

Send us the job at your present production costs — we'll run enough pieces through to develop tools and technique — built around the "Center Drive" — to so speed up output that development expense is absorbed. All tools and operating instructions will then be turned over to you — AT NO ADDITIONAL COST.

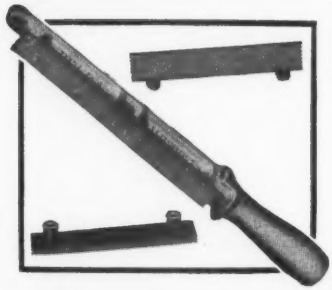
Write, wire or phone us today — we'll show you how a "Center Drive" increases PROFITS.

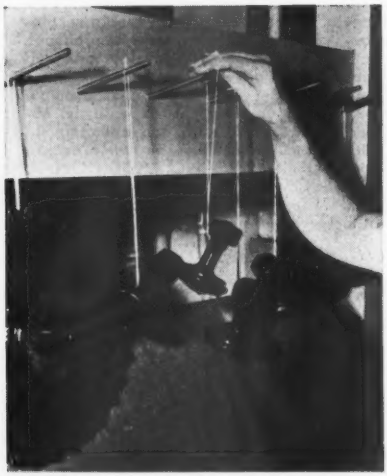
J. R. FISH RESEARCH & ENGINEERING CO.
SMALL TOOLS DIVISION

Our aim and intent—to provide an efficient world-wide organization to finance, develop, patent, manufacture and market NEW IDEAS and inventions.

1341 MAIN STREET, AGAWAM, MASS.
PHONE—SPRINGFIELD, MASS., 6-3694

PROGRESS ON PARADE





LATHE FILE. With a capacity for cutting steels no ordinary file will touch, at 3 to 10 times faster, while maintaining a life 50 to 200 times as long as average, this model F-45 is presented by Kennametal, Inc. As shown in the illustration insets, the Kennametal blanks have brazed-on nuts which serve to attach them by screws to the light-weight aluminum handle. Thus they are readily replaceable, and are available in two sizes of teeth, 20 teeth pi and 30 teeth pi. The same handle which accommodates either blank is designed for correctness and ease of use. The handle grip is shaped to fit the hand including a thumb rest and knuckle guard while a convenient finger hold beyond the filing surface is provided by an extension. A hole in this extension permits the file to be hung up. This F-45 File is available in one size: overall length 13½"; filing surface ¾" wide by 8" long; two Kennametal blanks sized ¾" by 4". These new, worthwhile features of the file have not increased its price. Made by KENNAMETAL, INC., Dept. TD, Latrobe, Pa.

INFORM-A-GRAM KEY No. 33-E

SUPER-SENSITIVE BALANCING WAYS. Simplified static balancing without need for centering is provided by these Ideal Balancing Ways which are invaluable on the production line, in plant maintenance and in repair work. Through use of special "scale type" bearings, accuracy to .007 oz.-in. is effected in the smallest or 10" size. The 20" and 42" sizes maintain accuracy to .009 oz.-in. Without need of leveling or setting up, Ideal Ways are placed on the floor or bench ready to use. The work is carried on free turning, hardened, ground O D discs which are mounted on ground spindles and balanced with extreme care. The spindles and discs are supported on rigid, solid casting end standards aligned on two shafts and movable to accommodate different sizes of work within the machine capacity. Shafts longer than standard are available. Ideal Balancing Ways are easily dis-assembled, compact to package and are simply transported to the job. They are available in four sizes: 10", 20", 42", and 60" from IDEAL COMMUTATOR DRESSER CO., Dept. TD, Sycamore, Ill.

INFORM-A-GRAM KEY No. 329.8-E

PLASTIC SKIN. The stubborn problem of providing corrosion-resistant, rust-proofing protection for small machine parts has been solved through use of plastic "soup" or dip coupled with fiberglas cord for suspending the parts.

Ordinary cotton or linen cord absorbs moisture through the short, cut-off length of cord remaining embedded in the plastic skin. Such moisture is then carried to the part and causes it to rust or corrode. However, the most minimum moisture pick-up is effected by use of fiberglas cord.

EVERYTHING YOU LOOK FOR IN

THERE are many jobs on which speedy power-driven rotary files can be used to advantage. Not only does the Nicholson line of sixteen standard shapes and many sizes meet virtually every practical need, but the quality features of these files should be scrupulously considered by both production and purchasing heads.

Keep in mind that Nicholson Rotary Files are—

Manufactured from high-speed steel • Carefully shaped and true-centered • Accurately cut or ground • Expertly hardened

—and that they are as sweepingly guaranteed as the Nicholson hand files which are famed for their slogan, *Twelve perfect files in every dozen.*

SEND FOR CATALOG AND PRICE LIST, and for any other desired information. For ordering, contact your mill-supply house.

NICHOLSON FILE CO., 95 ACORN ST., PROVIDENCE 1, R. I.
(In Canada, Port Hope, Ont.)

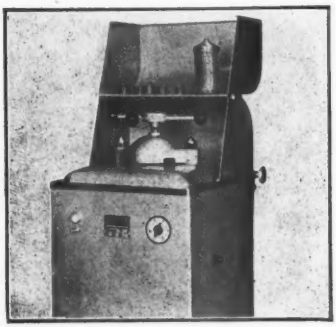
16 STANDARD SHAPES

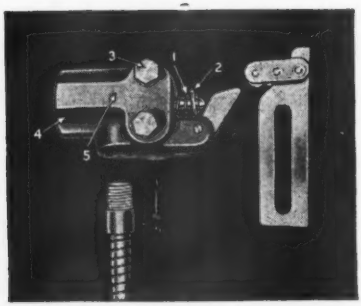
in either Hand Cut or Ground (see typical shapes in both types, above). 3 cuts—Coarse, Medium, Fine. ⅛" to 1⅛" diameters.

HAND CUT GROUND

NICHOLSON ROTARY FILES
HAND CUT AND GROUND—FOR EVERY PURPOSE

NICHOLSON U.S.A.





The parts are tied by a length of fiberglas cord to a conveyor chain which carries them through the plastic dip, or they can be dipped singly, by hand. When the dip is cooled it forms a tough, transparent, 1/10" thick, flexible skin which is easily peeled off just before the part is used.

It is estimated that this process cuts time required for packaging by 62 to 90%. The Eronel Thermodip plastic coating is supplied by Dade Bros., Inc. Fiberglas cord is available from OWENS-CORNING FIBERGLAS CORP., Dept. DJ, Toledo, Ohio.

INFORM-A-GRAM KEY No. A31-E

A NEW POLARIZER has been developed by the Precision Scientific Co., which is used to determine the amount of strain produced by fabrication or mechanical manipulation of transparent, rigid and non-rigid plastic materials and can also be used to identify transparent plastics. It consists of a source of illumination diffused through opal glass for uniformity. Above the light source are placed two polaroid sheets, sandwiched between clear glass, the upper glass section being adjustable through a distance of approximately 8". The lights are enclosed in a metal base, 15" square by 16" high, with a black Kem-Resist finish. Polaroids and glass plate are rubber cushioned and so framed to permit 11" x 11" sample size for observation.

Further information and literature on request from PRECISION SCIENTIFIC CO., Dept. TJ, 1750 N. Springfield Ave., Chicago 47, Ill.

INFORM-A-GRAM KEY No. F23-E

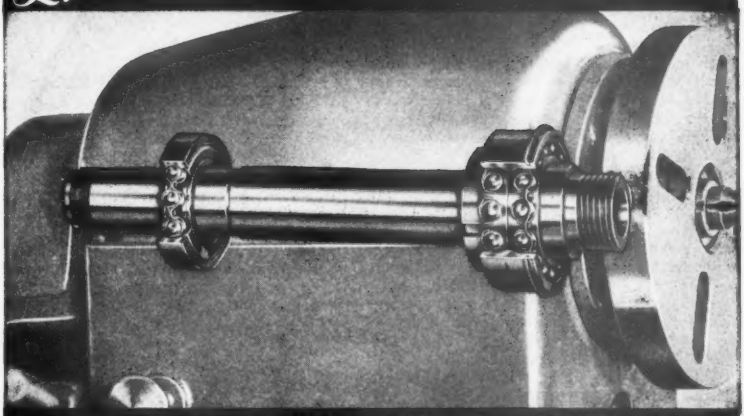
SPECIMEN MOUNTING PRESS. A newly designed Semi-Automatic Air Operated Specimen Mounting Press is being manufactured by the Precision Scientific Co. Utilizing air for operation, which is automatically set by a constant pressure reducing valve, it eliminates the hand operated hydraulic jack found in other types of mounting presses to maintain pressure on specimens while curing. This feature assures uniform specimens identical in size and hardness, improves polishing characteristics, and greatly reduces the operator's time.

Complete description of this press along with a complete line of metallurgical equipment will be found in Bulletin 850, available from PRECISION SCIENTIFIC CO., Dept. TJ, 1750 N. Springfield Ave., Chicago 47, Ill.

INFORM-A-GRAM KEY No. F23.5-E

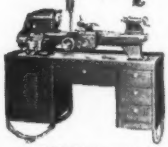
IMPROVED AUTOMATIC AIR BLAST VALVE for use on punch presses and other machinery has been announced by the Benjamin Electric Mfg. Co. Model N-207 valve connects to the supply line of compressed air and is actuated by a tripping device attached to the press ram or crankshaft. Each press stroke automatically releases an air blast at a point predetermined in the operation cycle. This blows the stamping with chips and scale from the die into a receptacle back of the

Logan A NAME TO REMEMBER WHEN YOU THINK OF BETTER LATHES



Higher Cutting Speeds Without Bearing Adjustment on *Logan* LATHES

No. 200 Screw Cutting Lathe



No. 825 Cabinet Model Quick Change Gear Lathe

SPECIFICATIONS common to all Logan Lathes: Swing over bed, 10½", Bed width across ways, 6-15/16", Bed length, 43⅛", Size of hole through spindle, 25/32", Spindle nose diameter and threads per inch, 1½"—8, 12 Spindle speeds, 30 to 1450 r.p.m., Size of motor, ⅓ or ½ h.p., 1750 r.p.m.; Preloaded precision ball bearing spindle mounting; Drum type reversing motor switch and cord; Precision ground ways, 2 prismatic "V" ways, and 2 flat ways.

THE pre-loaded ball bearing spindle mounting is one of the advanced design features which make Logan Lathes specially adapted to the needs of modern shops. With resulting increased spindle speeds, full advantage can be taken of the high cutting speeds used with carbide cutting tools. No bearing adjustment is required within the full range of Logan spindle speeds, from 30 r.p.m. to 1450 r.p.m., regardless of the cut. With Logan Lathes, consequently, the precise factory alignment of the spindle is not disturbed by periodic bearing adjustments, and original spindle accuracy is sustained. Grease-sealed, the ball bearings require no further lubrication or attention throughout their long service life. Maintenance costs and down time are kept at a minimum. The ball bearing spindle mounting is another reason why Logan Lathes increase output and decrease unit costs on production lines, and reduce man-hours per cutting job in tool rooms. For information on all Logan Lathes, see your nearest Logan dealer, or write direct for descriptive catalog.

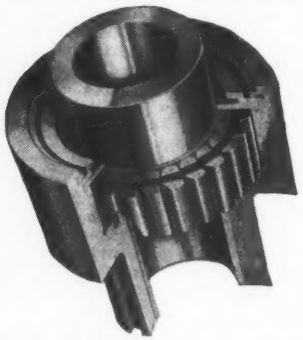
LOGAN ENGINEERING CO.

CHICAGO 30, ILLINOIS F-2

press. Thus the operator's time is only required for feeding parts into the die and periodical blowing or brushing of the dies is eliminated. Model N-207 can replace continuous air blasts in many machine operations besides those of punch presses and effects a very substantial saving in air as it operates only 1/6 of a cycle on the average job. The valve can be adapted to and actuated by any machine having reciprocating or rotating movement. Model N-207 is improved by a new return spring and stop washer on the valve pin, insuring a constant, air-tight seal with no danger of accidental pin movement; a larger, sturdier body of close-grained, semi-steel cast iron with new type mounting holes to facilitate installation; and an improved valve seat, machined and polished to extreme accuracy, with a hardened and polished valve plunger for a tighter seal. Produced by BENJAMIN ELECTRIC MFG. CO., Dept. TJ, Des Plaines, Ill.

INFORM-A-GRAM KEY No. F13-E

FORMSPRAG CLUTCH. New Full-Complement, Over-Running type. This clutch consists of cylindrical inner and outer races having the annular space between them filled with accurately formed sprags. At each end of these, an energizing annular spring maintains contact with both surfaces. Application of torque causes all the sprags to rotate simultaneously and grip both inner and outer races to form what is practically a single piece of metal. Removal of torque instan-



taneously releases all the sprags. Hundreds of times a minute positive engagement and disengagement may be made. Due to the large number of sprags, localized stress is reduced to a minimum and wear is evenly distributed throughout all the surfaces. Formsprag's torque carrying capacity, in general, is equal to the torque carrying capacity of any shaft having a diameter smaller than the inner race diameter. The simple design of Formsprag provides for the greatest torque capacity for the size and weight of the clutch. Designers and manufacturers of this device are THE GEAR GRINDING MACHINE CO., Dept. TJ, 3901 Christopher, Detroit 11, Mich.

INFORM-A-GRAM KEY No. B42-E

CLAMP, VOLZ FLAT SURFACE SAFETY LIFTING TYPE. When positioned in any way, this clamp picks up and securely holds any article having a sufficiently flat surface for the jaws to engage. When the load or weight is relieved from the jaw grip, it releases instantly and automatically. Volz clamps have two definite clamping principles, a pressure grip, and a wedge grip which supply a firm grip unhampered by surfaces coated with oil or grease. The movable jaw is actuated by the cantilever basic principle while the special construction of the station-

ary jaw provides tremendous wedge power and grip. From the shackle to the gripping jaws, this entire clamp is drop forged including the casing for all working parts which prevents their bending due to exposure. Volz clamps are available in four sizes: ½, 1, 3, and 6-ton capacities, and they accommodate thicknesses of from 0 to 2". These comparatively lightweight clamps are individually tested for double their rated load prior to shipment. It is produced by MERRILL BROTHERS, Dept. TD, 46-18 Arnold Ave., Maspeth, N. Y.

INFORM-A-GRAM KEY No. F14-E

Save production time with a SHOPLIFTER

- **Light, Compact**
- **Easily Moved About**
- **One-Man Operated**
- **Wide Range in Application**
- **Saves Production Time**
  In handling dies and heavy fixtures; stacking barrels, boxes, etc.; loading and unloading trucks

Specifications

Type—D
Capacity—500 lbs.
Overall height—72"
Platform lift—54" above floor level, lowers to within 5" of floor
Baseframe—24" wide x 33" long
Platform—24" x 24", steel plate
Entire frame of machine of structural steel, electrically arc welded throughout
Basewheels—4" diameter, iron wheels
Crank up and down hoist unit
Two swivel casters and two stationary wheels with push bar furnished
Painted olive green finish
Weight—250 lbs. (approx.)

Heavier capacities up to 5,000 lbs. also available. Write for details.

Prompt Delivery . . . Price $147.50. Full freight allowed

Foot Operated Floor Lock—$10.00 extra

ECONOMY ENGINEERING CO., 2659 W. Van Buren St., Chicago 12, Illinois

HERE'S A TESTED COLD-TREATING PROCEDURE...
A Simple Treatment that Saves this Manufacturer Time and Money in the Stabilization of Gauge Blocks, Lapping Flats, etc.

1. Heat treat as usual.
2. Subject to sub-zero temperatures in Deepfreeze —120° F. Industrial Chilling Machine for period of six hours.
3. Remove and let return to room temperature.
4. Hold at room temperature for period of six hours.
5. Repeat cycle six times.

Result—Transformation of Austenite into Martensite complete; cause of distortion eliminated in fraction of time required by traditional age hardening method.

Drilling and Tapping Operations Completed Without Tearing... Machining Done Without Distortion

This manufacturer experienced considerable difficulty in the production of hydraulic valves for aircraft. Drilling and tapping operations caused valves to tear; general machining caused excessive distortion.

Cold treating was recommended. Valves were subjected to a simple, inexpensive treatment in a Deepfreeze Industrial Chilling Machine. The result was outstanding. Both tearing and distortion were completely eliminated.

Today, by having all valves cold treated, production cost has decreased, production rate increased and valve quality greatly improved.

Cold Treating Aids Industry in Many Ways...

Cold Treating is being used with equally successful results for such purposes as hardening, stabilization, shrink-fit assembly, testing, etc. For complete information on the possibilities of applying cold treating to your production, contact Deepfreeze Engineering Service. Your inquiry will not obligate you in any way.

FREE! Valuable Production Help...
Get this 40-page Deepfreeze Booklet containing the latest cold treating information, including performance data stories, tested procedures, etc. All of this information can be used to improve your production. Send for your free copy today.

INDUSTRIAL DIGEST

SCIENCE • RESEARCH • METHODS • TOOLING
PRODUCTION • TRADE NEWS AND REPORTS

Industrial Test for Visual Acuity

A checkerboard pattern, recognizable by anyone regardless of nationality, education or ability to read, may replace the alphabet in testing visual acuity, the Bausch & Lomb Optical Company has disclosed.

It is being used both by the Navy and industrial concerns in visual classification and placement of personnel, said Fred W. Jobe of the company's scientific bureau.

The pattern, diamond-shaped, consists of nine alternating white and dark squares. One of the five dark squares is a small size checkerboard. As the test progresses, the checkerboard becomes so small as to be indistinguishable from the other four neutral gray, or dark squares. The testee is asked to determine in which of several positions the checkerboard is placed.

Mr. Jobe said the pattern is used in an ortho-rater, an instrument for the measurement of visual performance which permits such a rapid classification that each employee can be given the complete battery of 12 tests in from five to six minutes, about one-half minute per test.

These ortho-rater tests, said Mr. Jobe, can identify or point out the desirable visual skills best suited for any job; identify applicants whose visual performances are most suited to specific jobs; identify those employees who are in need of professional eye care because their visual performances are inadequate for their present jobs; and identify certain jobs that need to be redesigned or supplemented with optical aids or better illumination because visual adjustments are so severe few persons can adapt themselves.

Speedy Disposal of War Plant Facilities Planned

Speedy integration of surplus industrial plants into America's peacetime civilian economy so that more jobs may be created is the aim of Regulation No. 10 relating to the disposal of industrial property, recently issued by the Surplus Property Board. No preference is provided for contractors in possession who have been operating the plants for the Government during the war.

Speed in disposal is emphasized by the policy contained within the regulation. It specifies that: "Emphasis shall be placed upon the urgency of getting plants into civilian production speedily so as to provide maximum employment in the present major contribution to this objective which is made by small business . . . and the importance in this connection of the maintenance of free independent competitive enterprise and the establishment of a maximum of independent operators in industry."

To foster this basic aim, the regulation provides that the disposal agency "should seriously consider offers to purchase or lease which will result in a lower monetary return if the applicable objectives of the Act will be better attained thereby".

Veterans and small business are given preferential treatment. The regulation gives effect to the policy of SPB that industrial facilities, particularly medium-sized and small plants, be sold or leased to local or small firms, "preferably those owned or controlled by veterans". As previously announced by SPB, the Reconstruction Finance Corporation, which is the disposal agency for plants and producers' goods, is directed to accept

offers from responsible local groups with adequate working capital and other necessary qualifications and to extend liberal credit terms over a period of years, in preference to a cash offer from a firm or group that would tend to concentrate economic power.

Since the aim of SPB is to put surplus plants quickly into production so that jobs may be provided, Regulation No. 10 sets up certain safeguards against buying by speculators. It is provided that each purchaser must certify that he is acquiring property for his own use and not for resale or lease. No plant or part of a plant, excepting the Government-owned portion thereof, can be dismantled or moved without first giving 30 days notice to the government of the State and municipality in which the property is physically located. This is intended to protect local communities against the loss of employment from removal of war-acquired industry.

To be disposed of under this regulation of SPB are industrial plants representing 20-25 percent of the country's industrial facilities, or roughly one-third more than the country's productive capacity before the war.

The policy of SPB is to invite new enterprise to take over and operate these plants, thus bringing about an expanded competitive economy and a continuing rise in the American standard of living. Regulation No. 10 is devised to implement that basic policy as well as to speed the disposal and aid reconversion by creating jobs within the surplus plants at the earliest moment.

Wartime Protection of Vital Industry Revealed

With the announcement of the abolishment of the Resources Protection Board the War Production Board has revealed one of its most carefully guarded war secrets.

Hidden away in a rear wing of the Railroad Retirement Building in Washington, which has housed many WPB divisions, the Resources Protection Board worked without publicity and was unknown to the general public.

Created in May 1942, the board was given the job of deciding which of the many thousands of war and war supporting facilities of the American economy should be protected against hazards of chance and enemy design.

It was a big job, requiring complete analysis and continuing review of the whole of the U.S. wartime economy. To protect each and every plant and facility playing a part in the war program would have cost more in manpower and materials than the nation could spare while it waged total war. The board had to decide just where the emphasis on protection should be placed, just what plants and facilities had to be safeguarded beyond all question of doubt.

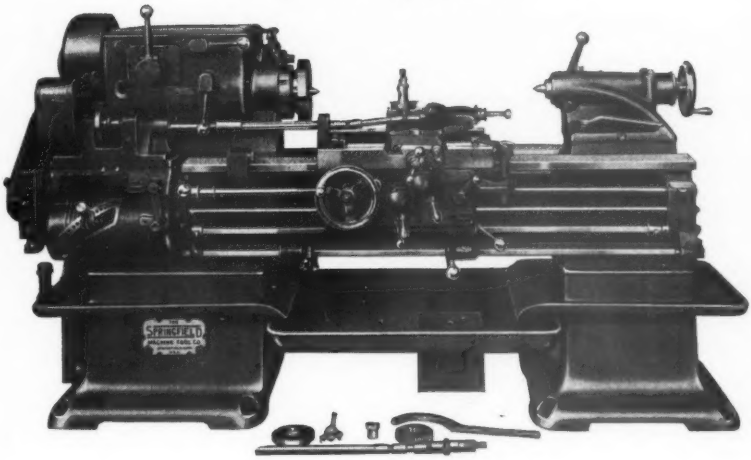
The board looked for the "choke points" in America's war production economy, and, in following through the processing of vital war products from the raw materials stage to the finished item, uncovered startling concentrations of 100 percent of the country's total production of some essential items in one or two plants. Almost invariably such plants were not producers of the finished product the Army or Navy purchased, but were processors of some intermediate product without which the finished product could not be made.

An illustration of the board's spotting of "choke points" was its handling of aluminum. Aluminum is made from an ore called bauxite. In the early stages of the war, all bauxite was imported from Dutch Guiana. Investigation revealed that the bauxite mines in Dutch Guiana were fairly numerous and scattered. Had one or more mines been knocked out or temporarily put out of commission it might have been serious but not disastrous. However, all the ore was shipped from one port, the only port available. That port was vital. Had it been attacked successfully by undersea or air or surface raiders, the effect on our production of aluminum would have been disastrous. It was decided, therefore, to give the loading docks and related facilities at that port the highest priority rating for protection, and the armed services provided the utmost in protection.

The conversion of alumina to aluminum requires cryolite, a material used as a fluxing medium. No great quantity

SPRINGFIELD PRECISION LATHE

Out in front!



● Headstock . . . twelve speeds . . . only half of the easy-shifting spur gears mesh at one time.

Motors . . . V-Belt or silent chain drive.

Bed . . . permanently true—made of high test alloy to resist warp or marring under severe service.

Apron . . . extra heavy—operates on Ball and Bronze bearings throughout.

Taper attachment . . . hair-trigger adjustment.

Compound rest . . . sturdy, firm.

Tailstock . . . all bearings and bed ways oiled from one well.

From headstock to tailstock — the SPRINGFIELD Lathe is *out in front!*

SEND TODAY FOR BULLETIN No. 163

Tells the why and how of Springfield's accurate production.

THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD • OHIO, U. S. A.

of cryolite is required, but without it, it is impossible to convert alumina into aluminum. Crude cryolite was obtainable only in Greenland. After importation into the United States it had to be refined before it could be used. There was only one such refinery in the United States, a relatively small plant employing a few dozen people located in a small Pennsylvania town.

That plant was so highly important to America's war program that, following the board's report to the War Department, the Army hurried a detachment of troops to the scene. It was discovered that the plant's sole protection was one aged watchman whose principal job was to tend a gate to allow a switching engine to bring in cars of the crude product and haul away cars of the refined cryolite each night.

Another instance of 100 percent of total production of a vital product concentrated in one plant is that of tantalum, a rare metal essential to the manufacture of tubes for radar sets. The only source of supply for tantalum, not only for the United States but for all the United Nations, was a plant located in Chicago. The intense race between the Allies and Germany for superiority in the rapidly developing radar field, in which the Allies excelled their enemy, would have been an entirely different kind of race had that one plant in Chicago been crippled or destroyed.

When the WPB studies revealed a dangerously large concentration of production of vital war products in one or a few plants, it was WPB's further job to point out that concentration to the responsible production officials in Washington so that production might be dispersed among several plants. The example of concentration of cryolite refining, already cited, did not hold for long, because WPB ordered additional refineries to be built, and that production of synthetic cryolite be undertaken. As additional plants came into production, the percentage of concentration in any one plant decreased, and the protection ratings, under the formula, decreased accordingly.

The board's survey covered not only

SERVING INDUSTRY

New Building Construction
Additions • Alterations

CUNNINGHAM - RUDY COMPANY
General Builders
3087 W. GRAND BLVD.
DETROIT, MICH.
MA. 0742

CAST PLASTIC SEPARATOR MASKS

● Instead of replacing a lost punching die which had been used for making spray form caps required for separating parts during painting and baking, one manufacturer cast the caps or separators in a Durez liquid phenolic casting resin.

MOLD SIMPLE TO MAKE

A mold into which the resin could be poured had to be made first. This was easily achieved by the simple expedient of using one of the original caps as a model and pouring the Durez casting resin around it. Since close tolerances were not required, a chrome-plated steel plug was eye-centered in this mold and new caps were made from the casting resin quickly and easily. Wax was used as the parting agent.

SUBJECTED TO 350°F.

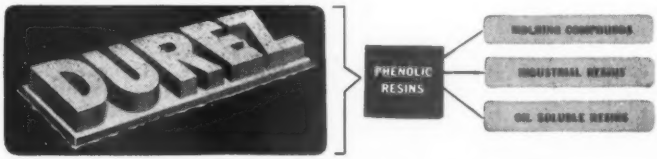
These cast plastic separator masks are subjected to 350° F. in an oven daily, for short periods. Caps which have been through the oven for more than 1000 hours show no evidence of deterioration. The manufacturer further reports that fewer rejects have been encountered since using the new plastic separator masks. Naturally, this means that production was increased on the one hand, with the cost of sprayed and baked parts decreased on the other.

OTHER USES FOR CAST RESINS

A few other time- and cost-saving uses for these remarkable resins are hydropress and stretchpress dies, jigs, assembly and holding fixtures, foundry patterns, and masking shields for plating.

AUTHORITATIVE FOLDER AVAILABLE

A technical booklet giving valuable detailed information about Durez casting resins is available free. No obligation, of course. Durez Plastics & Chemicals, Inc., 5911 Walck Road, N. Tonawanda, N. Y. *Export Agents — Omni Products Corporation, 40 East 34th Street, New York 16, N. Y.*



PLASTICS THAT FIT THE JOB

plants but essential facilities such as power plants, railway bridges, etc. The "Soo" locks connecting Lakes Superior and Huron, for example, were one of its major concerns. Nearly all of this country's iron ore passes through these locks on its way from the ore mines to the steel mills. Destruction of the locks would have meant the shutting down of practically every steel mill in the country until such a time as they could be repaired and put back into operation, a matter of several months, probably.

The proximity of Hudson Bay to the "Soo" locks, a matter of only some four hundred miles, was the cause of many headaches. Long range German seaplanes could have flown the northern route into the vastness of Hudson Bay undetected, rendezvoused with an enemy submarine there, loaded bombs and refueled and taken off for the relatively short run direct to the "Soo" locks. Those locks were of such concern to the officials in Washington that a brand new railroad, the Escanaba, was built to haul at least a portion of ore should the locks be destroyed.

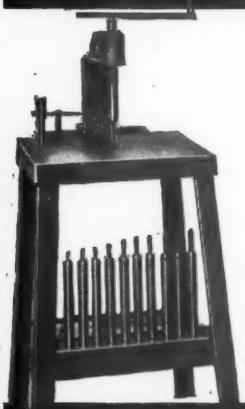
The bulky samples and literature which American exporters have heretofore sent abroad to promote sales may be displaced to a very large extent in future years by industrial motion picture films which combine the art of ideal salesmanship with complete demonstration, according to the Department of Commerce.

Motion Pictures Important Foreign Sales Tool

Nathan D. Golden, Chief, Motion Picture Unit, Bureau of Foreign and Domestic Commerce, has stated that American-made entertainment films which contain no conscious trade propaganda have for many years served as silent ambassadors for American-made goods in foreign countries.

Despite the indirect influence of the entertainment film on the export trade of the United States it still remains the function of the industrial film to exert

A "PAIR" THAT'S HARD TO BEAT



They save time and labor in your tool room and turn out more accurate work.

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The Bay State Hand Tapper eliminates tap wrenches and minimizes tap breakage — is instantly ready, no set-up required. Long spindles reach down between projections. Simple, quick and easy to operate.

• • • •

The Bay State Handy Vise for all around accurate tool room use is made of hardened and ground steel—light in weight, yet sturdily made. A precision tool that grips and handles thick or thin pieces for tapping, drilling, reaming or jig boring.

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Write for descriptive circular.
Distributor inquiries invited for some sections.

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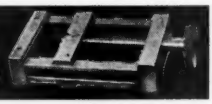

525 Lap Weld seams per HOUR!

By equipping this resistance welding machine with EIGHT*

AIRGRIP
Dual Action
NON-ROTATING CYLINDERS

"AIRGRIP" Non-Rotating Cylinders on Resistance Welding Machine of the Resistance Welder Corp., Bay City, Mich. Either end of the "AIRGRIP" Non-Rotating Cylinder can be removed, leaving rest completely assembled.

Lap weld seams on 525 cylindrical containers in one hour!—and quality, uniformity and smoothness of welds improved. "AIRGRIP" Cylinders do four jobs: (1) Clamp the work. (2) Unclamp it. (3) Lock fixtures. (4) Apply welding pressure.

"AIRGRIP" Cylinders have no tie-rods. Ample strength provided by making metal of cylinder walls extra thick —$\frac{9}{16}$ of an inch.

"AIRGRIP" Non-Rotating Cylinders speed production in many ways. Tell us your machine operations. Our engineers will gladly make recommendations.

OTHER ANKER-HOLTH COST REDUCERS

"AIRGRIP" Chucks and Rotating Cylinders, Air-operated Collets, Arbors, Mandrels, Drill Press Chucks, 2- and 3-jaw Finger and Compensating Chucks, Lubricating Assemblies, 3- or 4-way Air Valves (hand or foot operated), etc. Also Hydraulic Power Units and Fittings.

Representatives in all principal cities. Write for Bulletins.

* On this welding machine the "AIRGRIP" Cylinders operate in pairs because two cylindrical containers are welded simultaneously.

ANKER-HOLTH MFG. CO.

2735 Connors Street • Port Huron, Mich.

When buying new lathes, specify "AIRGRIP" Chucks and Cylinders

direct selling pressure in foreign markets, according to Mr. Golden. Close-ups, slow motion, and the great variety of camera angles which are permitted provides the motion picture with some distinct advantages which cannot be incorporated in other trade promotion media.

The motion picture is particularly valuable in foreign trade promotion when utilized for furnishing the intelligent technical assistance which should be supplied in order that American-made machinery and other equipment sold abroad may be efficiently maintained and operated. He stated that the motion picture film when properly employed should go a long way in winning and maintaining a proportionate share of world markets for American goods.

It is the hope of the Bureau of Foreign and Domestic Commerce in cooperation with the Department of State to formulate plans for the exhibition of industrial motion picture films in foreign offices of the United States Government.

Mr. Golden stated that the exhibition of industrial films to promote export sales is a two-way proposition since the United States must purchase goods or services from foreign countries to provide them with the dollar exchange for the purchase of American goods.

Back-to-School Drive

John W. Studebaker, Commissioner of the United States Office of Education, Federal Security Agency, has requested school superintendents in the nation's large cities to actively support the current National Back-to-School Drive.

Pointing out that school officials are in a strategic position to influence public opinion and to make a direct appeal to youth to go back to school, the Commissioner urged school superintendents to call public attention to the fact that war pressures for four years have pushed high school enrollment down and youth employment up.

FOR THE RIGHT ANGLE IN LESS TIME

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ROTO-SINE

TRADE MARK

Difficult compound or single angle set-ups are obtained quickly, accurately with Roto-Sine and gage blocks. For drilling, boring, machining. A high precision tool that pays for itself in tooling or production operations.

Available in 5 inch and 10 inch models.
Table sizes—

5" Model A— 5½ x 8
10" Model B— 7 x 12
10" Model C—10½ x 12

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CTW

45—47

The *Right* Tool Where and When You Want it

CONTINENTAL *Counterbore sets . . .*

. . consisting of carefully selected variations and sizes to provide the most practical and economical combinations for toolroom use . . . are proving favorite cutting tools in all kinds of machine shops. Continental interchangeable counterboring and spotfacing tools have a wide range of uses. Two standard sets are shown below. Write to Continental today for details.

Above: Set No. 2, for the average-size toolroom.

To right: Set No. 3, for general needs of larger shops.

CONTINENTAL TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION

DETROIT 6, MICHIGAN

"This trend must now be reversed," e Commissioner said, citing statistics owing that high school attendance had creased 1,250,000 from 1940 to 1945 id that youth employment had risen om 900,000 in '40 to 3,000,000 in '45. Last year a national go-to-school drive d very favorable results. This year's ive, it is hoped, will have even greater sults in helping high-school youth to e the importance of making a high-hool education their immediate princi-l objective, FSA said.

Apprentice Training for Returning Servicemen

In reply to the thousands of inquiries om men in service for information on prenticeship, a comprehensive booklet on the subject has been prepared especially for their guidance by Apprentice-Training Service, U. S. Department of Labor. This booklet, entitled "Apprentice Training for Returning Servicemen", has been written in collaboration with educational branches of the War and Navy Departments, and the Veterans Administration.

While the booklet is designed primarily for the men still in the services, it is of equal value to those already released from the service, and also to employers and labor organizations, especially in gaining a clear understanding of the veterans' legislation as applied to ex-servicemen employed as apprentices.

Included in the information contained in this booklet is an explanation of the financial benefits of the veterans' legislation which supplement apprentice wages, qualifications required of veterans for these benefits, as well as for apprentice training, procedure to follow, application forms and experience records needed. Among the other data presented is a list of over 100 skilled trades in which workers are trained through apprenticeship and ten major points which identify a bona fide apprenticeship program.

Write to Apprentice-Training Service, Dept. of Labor, 1778 Pennsylvania Ave., N. W., Washington 25, D. C., for a copy.

NATURE DIDN'T KNURL YOUR FINGERS

So *WE Knurled* the "UNBRAKO" Socket Head Cap Screw!

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Reg. U. S. Pat. Off.

Nature may have made it inconvenient by forgetting to knurl your fingers, but the "Unbrako" Socket Head Cap Screws make life a lot easier, with their knurled heads that become geared to even the oiliest fingers. Naturally, they're time-savers because they can be screwed-in farther and faster before using a wrench. In sizes from No. 0 to 1½" in diameter — full range of lengths. Write today for our "Unbrako" Catalog.

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Recent U. S. Patents

Among recently issued U. S. Patents the following are of Tooling interest. If you are interested in studying any of these Patents, simply advise "Patent Information Service," The Tool & Die Journal, 2460 Fairmount Blvd., Cleveland 6, Ohio, enclosing 20 cents for each Patent desired and we will gladly forward your order to Washington.

GRINDER OR TURNING LATHE DOG, No. 2,383,943.
WELDROD HOLDER AND EJECTOR, No. 2,383,951.
DRILL GUIDE, No. 2,383,953.
MACHINE FOR BORING, No. 2,383,958.
DIE HOLDER AND TAILSTOCK CENTER, No. 2,383,991.
ATTACHMENT FOR TEST INDICATORS, No. 2,384,058.
INSTRUMENT FOR LOCATING AND SPACING BORED HOLES, No. 2,384,071.
MILLING MACHINE, No. 2,384,133.
PRESS STRUCTURE, No. 2,384,161.
BRIQUETTING PRESS, No. 2,384,163.
SELF-LOCKING SCREW AND NUT, No. 2,384,177
HAND-FEED CONTROL MEANS FOR DUPLICATING MACHINES, No. 2,384,196.
TOOL AND METHOD FOR MAKING THE SAME, No. 2,384,204.
POWDER METALLURGY, No. 2,384,215.
METHOD OF MAKING STAMPING DIES FOR ALUMINUM SHEET AND THE LIKE, No. 2,384,229.
FORM CRUSHING OF ABRASIVE WHEELS, No. 2,384,289.
CHUCK, No. 2,384,302.
INSIDE MICROMETER, No. 2,384,343.
FORGING DIE, No. 2,384,349.
BAND SAW, No. 2,384,364.
DUST COLLECTOR FOR GRINDING AND OTHER MACHINES, No. 2,384,414.
RIVETING TOOL, No. 2,384,434.

ENGINEERS AND PRODUCTION WARNING!

DON'T BE LAST! **Abandon less perfect duplication in mounting parts. Your product quality can be no better than your mounting methods. Surprise customers, superiors, yourself with maximum practical "out-of-round" and concentric perfection, despite generous tolerances or operator skill. Concentricity in low 10,000ths is yours—*automatically*.**

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Curtiss-Wright Corporation ranks our product with THEIR BEST TOOLS. Cleveland Graphite Bronze Co., leading bearing manufacturer, states new high accuracy reached, plus substantial production boosts with

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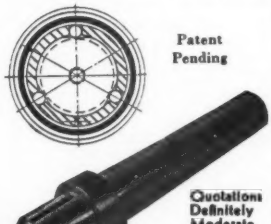
INSPECTION AND GAGE FOREMEN NOTICE! No more tapered tool surfaces for parts mounting. Check concentricity and squareness of parts, mounted between centers, with assured parallelism of our sleeve surface to mandrel center line. Whether tool is expanded or contracted, no tapers are involved nor tapers or arcs developed, via expansion, in either production or parts inspection.



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PUBLICATION PREVIEWS

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HARD-FACING ALLOYS are explained in an illustrated 8-page Catalog, No 76, published by WALL-COLMONOY CORP., Dept. T, 720 Fisher Bldg., Detroit 2, Mich. Colmonoy may be applied as a hard-facing to another metal in a number of ways, either in the production of original equipment or in the maintenance and repair of existing equipment. Abrasion, galling, corrosion and impact resistance, high red hardness, hot plasticity, castability and machinability may be obtained by the proper selection of a Colmonoy alloy. Colmonoy is easily applied to plain or complex surfaces and to most plain or complex ferrous alloys.

INFORM-A-GRAM KEY No. 849-E

FORMING PRESS DIES AND THEIR USES is the title of a 128-page book published by the DREIS & KRUMP MFG. CO., Dept. T-5, 7400 Loomis Blvd., Chicago 36, Ill. The die designer as well as the Press Brake operator will find this book valuable. Production engineers and estimators will find short-cuts, in the designs of odd-shaped dies particularly adapted for producing many "out of the ordinary" bends. All dies shown can be used on standard modern types of Press Brakes. Some dies, such as multiple punching attachments, are for particular types of Press Brakes, but all can be adapted to any regular Press Brake.

INFORM-A-GRAM KEY No. F37-E

CYLINDRICAL SUB-PRESSES, Arch, No. 75 and Overhang, No. 60 Models, are featured in a folder published by WALTHAM MACHINE WORKS, Dept. T-3, Waltham, Mass. The Arch Sub-Press, No. 75, is recommended for strip work since the symmetrical construction renders it more rugged. The Overhang Model, No. 60, provides for best access and visibility for the manual positioning of blanks. When these Sub-Presses are purchased without dies, hubs are only rough turned with no recessing although the bases are jig-drilled for screws and dowels. The lower part of the barrel must be finish bored and faced true on the centers of the plunger by the die-maker, but screw holes are jig-drilled and tapped. Both the Arch and Overhang Sub-Presses are available in 10 sizes, the minimum having an 8.2" height, 1.2" plunger dia, and the maximum having a 10" height, 6" plunger dia. This fully descriptive folder contains complete specifications and list prices.

INFORM-A-GRAM KEY No. 514-E

MOGUL METALLIZING GUN is featured in Bulletin No. F-1A published by the METALLIZING COMPANY OF AMERICA, Dept. TD-4, 1330 W. Congress St., Chicago 7, Ill. Model F with tool post mounting is recommended for shaft work and is also furnished with pistol grip. Model FH is recommended for manual spraying. A specially designed taper valve permits ¾ range for lighting gun. In one operation, air, gas and oxygen are turned on in their proper sequence and proportion. The correct mixture of gases in Mogul Guns reduces gas fumes to a minimum and the metal is not subject to oxidation from being held suspended in the flame.

INFORM-A-GRAM KEY No. 389-E

CLEVELAND FASTENERS, made by the Kaufman Double Extrusion Process, are pictorially described in Catalog F published by the CLEVELAND CAP SCREW CO., Dept. T-5, 2917 E. 79th St., Cleveland 4, Ohio. Specifications of Cap and Socket Screws, Milled Studs, Special Upset Products and Set Screws are included. Many specially designed headed and threaded parts that have been previously made on screw machines can be produced by the upset method, or cold forging, with all-around advantages. This method results in a stronger product by shaping the part without cutting—creates a more closely knit grain structure on the surface while preserving the interior ductility of the steel. With hardening as required, in modern electric furnaces, the part is tough and dependable.

INFORM-A-GRAM KEY No. F19-E

MASTER SURFACE PLATES, made to meet the most exacting requirements of the tool, gage and aircraft industries, are featured in a 4-page bulletin issued by SMITH TOOL & ENGINEERING CO., Dept. J-3, 858 N. Sandusky Ave., Bucyrus, Ohio. The large elliptical rib, reinforced with internal spider rib construction and supporting ribs to outer

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They are going to mean better machines, better appliances, for living and working.

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Pipe Machinery carries in stock a large assortment of standard plug, ring and thread gages from which prompt shipment can be made.

And we shall be glad to quote you prices and delivery dates on special gages to meet particular requirements.

ARMY E NAVY

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BLICATION REVIEWS

dges, is an exclusive feature of these plates. recision Lapping Plates, specifically designed for developing a true plane of close olerance thus insuring a perfect fit when lapping metal-to-metal joints, and meeting all ther applications requiring accurately flat pped surfaces, are also described.

INFORM-A-GRAM KEY No. 465-E

HIGH PRESSURE GEAR PUMP for industrial se is illustrated in a descriptive Bulletin, No. 01, issued by PESCO PRODUCTS CO., Division Borg-Warner, Dept. T-5, 11610 Euclid ve., Cleveland 6, Ohio. Model No. 051001-10-01 offers long trouble-free operation for any varied applications. Industrial tractors, ydraulic lifts, conveyors, farm and road-uilding machinery are but a few of the many ses for which it is ideally suited. The exclu-ve Pesco patented "pressure loading" prin-ple is featured in this high pressure gear ump. "Pressure loading" utilizes the pres-ure developed by the pump to maintain a inimum end clearance between the bearings nd the gears.

INFORM-A-GRAM KEY No. F28-E

KEMPSMITH ARBORS & ACCESSORIES for l types of milling machines are the subject of bulletin No. 116 published by THE KEMPSMITH MACHINE CO., Dept. D-4, Milwaukee 14, Wis. Kempsmith arbors and accessories can be used on any milling machine, regardless of make, as long as it is equipped with a National Standard spindle end. The arbors and accessories listed in this bulletin are standard equipment, in constant demand in the milling industry, and are generally carried in stock by the Kempsmith Machine Co. Other special sizes and types (arbors, adapters or any other accessory), made exactly to user specifications, can be supplied on short notice.

INFORM-A-GRAM KEY No. C47-E

A-PE-CO PHOTO EXACT is explained in Form P-452, issued by AMERICAN PHOTO-COPY EQUIPMENT CO., Dept. AA115, 2849 N. Clark St., Chicago 14, Ill. It produces accurate, speedy photocopies of anything written, printed, typed, drawn or photographed. Photocopies eliminate copy errors, time consuming stenographic work, and need of proof-reading. They are exact, easy to read, and permanent enough for much handling. This folder shows you how A-PE-CO expedites shop and office work, saves man-hours, and relieves the work of other office equipment.

INFORM-A-GRAM KEY No. 3-E

UNIVERSAL SPIRAL DIVIDING HEAD, Milwaukee Model K, is fully illustrated with photographs and working drawings in catalog WA12, issued by KEARNEY & TRECKER

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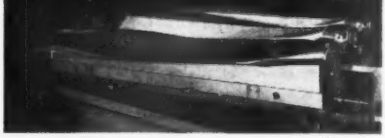

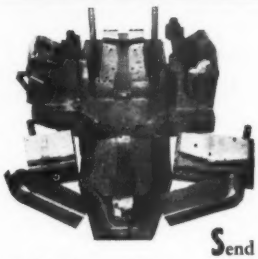

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Send us just one set of drawings and we will cast your die set on the following terms — satisfaction or no invoice. We've done it before. We're willing to do it again.

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Save time on machining and reach your presses sooner.
Stay in service longer between redressings and out-last dies of ordinary metal.

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Don't fail to have us cast a trial die set.

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DRAWING AND FORMING DIE METAL

YOU GET:

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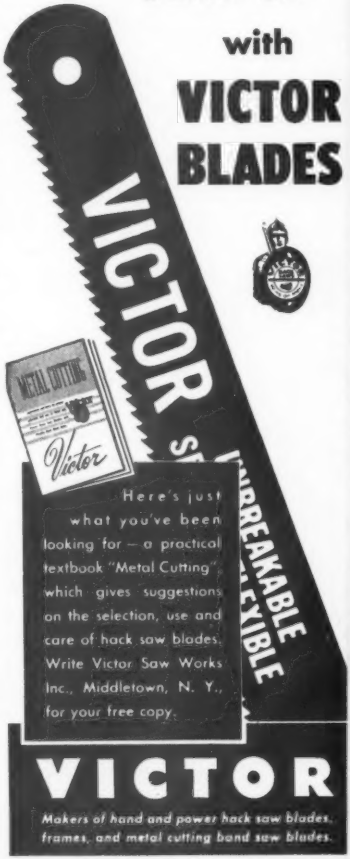

Here's just what you've been looking for — a practical textbook "Metal Cutting", which gives suggestions on the selection, use and care of hack saw blades. Write Victor Saw Works Inc., Middletown, N. Y., for your free copy.

VICTOR

Makers of hand and power hack saw blades, frames, and metal cutting band saw blades.

BLICATION REVIEWS

CORP., Dept. T-4, Milwaukee, Wis. Besides he unit's complete description, it contains worthwhile instruction for Model K's operation. Also featured herein are the Astronomical Divider and Low Lead Attachments. Practically any indexing, lead or spiral milling operation can be performed efficiently and accurately with this equipment. Performance accuracy is assured by the substantial, precision engineered construction with the ease of operation which characterizes these attachments.

INFORM-A-GRAM KEY No. 592.5-E

MICCROLOID, a new industrial maintenance coating for greater protection against corrosion is detailed in a new bulletin available from the MICHIGAN CHROME & CHEMICAL CO., Dept. T, 6340 E. Jefferson Ave., Detroit 7, Mich. This corrosive resistant is compounded from thermo-plastic resins. It is a tough, resilient, firmly adhering film offering remarkable resistance to the most severe corrosive conditions. Immediate use for this product is being anticipated for plating equipment, acid and alkali rinse tanks, structural steel, factory walls and floors, pipe lines, air ducts, blower equipment, ventilating systems, process piping and tubing, water storage cases, water softening and refrigerating equipment and photo equipment. It is effectively used on metal, concrete and wood surfaces—and the exterior of tanks heated up to 150° F and even far higher temperatures.

INFORM-A-GRAM KEY No. 997-E

GAGING OF PRECISION HOLES is discussed in Bulletin No. 31 describing the "Shock-Absorbing Comtorplug Internal Comparator" just released by THE COMTOR CO., Dept. TJ, 82 Rumford Ave., Waltham 54, Mass. Contents include: description of the unique Comtorplug principle of gaging precision holes, to fractions of .0001", providing automatic self-alignment and self-centering of this expanding plug gage; illustrations of Comtorplugs in use on actual work gaging holes in various products and parts; description of the sizes and capacities from ¼" diameter to 8" diameter and larger, also special types with extended inreaches up to 17" or more; explanation of the interchangeability of all plugs in any amplifier; description of the shock-absorbing construction which suits Comtorplug to use by machine operators and bench inspectors as well as final laboratory inspectors and a complete list of sizes and prices.

INFORM-A-GRAM KEY No. A3-E

"HELI-COIL" SPARK PLUG BUSHINGS are photographically described in Bulletin 237-A released by AIRCRAFT SCREW PRODUCTS

Every OPERATOR QUICKLY LEARNS PRECISION TAPPING....

on a Procunier Tapping Machine

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Tool & Die Journal Staff

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	9/32"	2.82
	19/64"	2.93
	5/16"	3.02
	21/64"	3.18
	11/32"	3.36
	23/64"	3.56
	3/8"	3.75
	25/64"	3.95
	13/32"	4.14
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PUBLICATION PREVIEWS

CO., INC., Dept. T-6, 47-23 35th St., Long Island City 1, N. Y. Complete details of the advantages of these bushings as opposed to various other types of installations are included along with data on assembly and servicing. The use of "Heli-Coil" Screw Thread Inserts as 14 and 18-mm Spark Plug Bushings is one of the most important applications of this relatively new product.

INFORM-A-GRAM KEY No. 177-E

CUSHMAN CHUCKS are presented in a photographically descriptive Catalog, No. 61, published by the CUSHMAN CHUCK CO., Dept. T-4, Hartford, Conn. Comprising one hundred pages of listings, blue prints and dimension tables, it not only gives illustrations and prices of all Cushman Chucks and their component parts but also includes all needed dimension data for the use of engineering departments and tool engineers. Also featured are dimensions and illustrations of new lathe spindle noses.

INFORM-A-GRAM KEY No. 64-E

V-BELT CONNECTORS are the subject of Bulletin 45-A just published by the SHIPPERT MFG. CO., 414K S. Galena Ave., Dixon, Ill. A few features include information on how to solve belt problems with handy V-belt connectors, V-belts that are made to fit your drives, Tite-Grip Fasteners, Grip-Flex Lacing for V-belts to connect cord-rubber V-belts of all makes and Rola-Flex Lacing for V-belts to connect duck fabric-rubber or leather. The free roller action of their all hardened steel roller action helps to absorb the shock of belt flex as it passes over the pulley. The half link form of construction makes possible the complete assembly of the link on each end of the V-belt before it leaves the shop. At the place of installing the belt, all that is necessary is to snap the half links together and insert two simple cotter keys.

INFORM-A-GRAM KEY No. F32-E

MECH-MASTER TOGGLE CLAMP, which is instantly adjustable as to vertical capacity, is described in an illustrated bulletin issued by the MECHANICS ENGINEERING CO., Dept. T-6, Box 243, Jackson, Mich. This clamp features an unusually wide clamping range from 22½° above horizontal to 22½° below horizontal and is instantly adjustable to any dimension by a quick turn of the handle. Because of this feature no bolt retainer and bolt hold-down is needed.

INFORM-A-GRAM KEY No. B59-E

GAS FIRED TOOLROOM BOX TYPE FURNACES are featured in a recently published bulletin 160 by LINDBERG ENGINEERING CO., Dept. J, 2450 W. Hubbard St., Chicago

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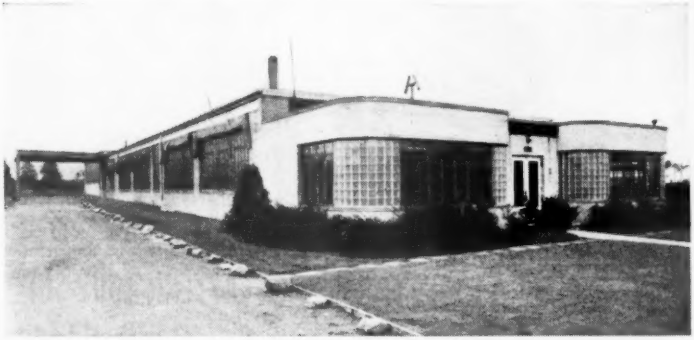

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12, Ill. They are designed for low cost tempering or preheating of tools, dies and other small parts and utilize the Cyclone forced convection principle by which work is heated with rapid uniformity. These Lindberg Cyclone furnaces supply heat at temperatures which range from 250 to 1250 degrees F, and the 12 standard sizes have heating chamber dimensions of from 12" x 16" x 18" to 24" x 48" x 24".

INFORM-A-GRAM KEY No. 369-E

HIGH SPEED STEEL—Novo Superior High Speed Steel, made by carefully and definitely controlled metallurgical processes which guarantee a quality product, is discussed in a 4-page folder available from H. BOKER & CO., INC., Dept. T-6 101 Duane St., New York, N. Y. Novo Superior has been used successfully for many types of tools such as Blanking Punches and Dies, Form Cutters, Reamer Blades, Boring Tools, Hobs, Gear Cutters and Twist Drills. Recommendations for working this high speed steel are included.

INFORM-A-GRAM KEY No. F31-E

DOW CORNING SILICONES, new engineering materials produced in many forms including Fluids, Greases and Compounds, Resins and Varnishes, and Silastic, the Dow Corning silicone rubber, are pictorially described in a new colorful booklet issued by the DOW CORNING CORP., Dept. TD-4, Midland, Mich. Charts and graphs demonstrating the unusual properties of this rapidly increasing family of organo-silicon-oxide polymers are featured. All of the above main classes of silicone products and many special formulations among each of them are described in this new booklet. Many industrial uses for these heat stabile, waterproof materials are presented and many more will be suggested by their quite unique properties.

INFORM-A-GRAM KEY No. B53-E

SAFETY BLOCKS of Dowmetal, a lightweight magnesium, help to minimize the hazard of accidentally tripped presses. They are made by the DOW CHEMICAL CO., Dept. T-2, Midland, Mich., and featured in a lately issued brochure. These extruded blocks, which are less costly than cast blocks, may be ordered in any desired length within the manufacturing limitations of the section. The available three standard lengths are: No. 1, 20'; No. 2, 15'; and No. 3, 10'. For use in small presses, Dowmetal Blocks can be adjusted by the user to conform to various sized die openings. Elimination of costly and dangerous accidents through use of safety blocks is vitally important to all owners and users of sheet metal forming presses.

INFORM-A-GRAM KEY No. 275.5-E

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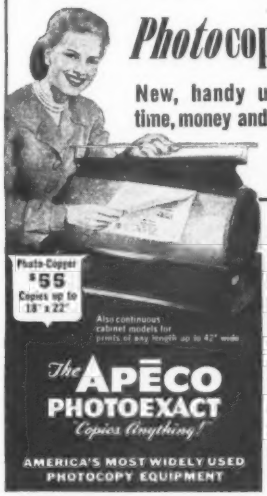
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PUBLICATION PREVIEWS

CUTTING GEAR TEETH ON A MILLING MACHINE is the title of a new publication just announced by THE CINCINNATI MILLING MACHINE CO., Dept. T-6, Cincinnati 9, Ohio. This booklet contains brief instructions on cutting worms, worm-wheels and spur, helical and bevel gear teeth on any milling machine. Bevel gears and worm-wheels are only recommended for miller cutting as an emergency repair measure or for cutting single parts for experimental use. The booklet is addressed to operators having a good working knowledge of the milling machine with no need of instruction on elementary details of setups. Index tables and tables of leads have been omitted, although they are singly obtainable by sending machine serial number and details of your gear cutting equipment.

INFORM-A-GRAM KEY No. 233-E

"DIE-CO ACCESSORIES CATALOG NO. 4", prepared by the DIE SUPPLY CO., Dept. TD, 4747 Hough Ave., Cleveland 3, O., contains 40 pages of their complete line of accessories for Tool and Die Makers and Machine Shops. Included among the items listed and illustrated is a large variety of Die Springs from which the die designers may select the type best suited to the requirements of the job. Charts list sizes and data pertaining to load and deflection. Other supplies listed include many types of Socket Screws, Steel Machine

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Features:

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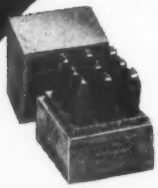

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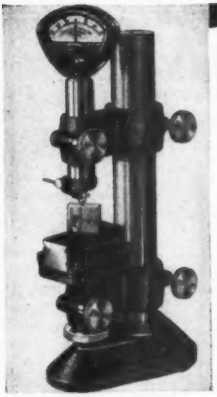

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PUBLICATION PREVIEWS

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INFORM-A-GRAM KEY No. 550-E

FLEXIBLE SHAFT MACHINES & EQUIPMENT are introduced and illustrated in Wyco Catalog No. 44 issued by WYZENBEEK & STAFF, INC., Dept. T-5, 838 W. Hubbard St., Chicago 22, Ill. Herein are shown the complete Wyco Line, including the new Wycoflex "Universal" High Speed Grinder with speeds of up to 18,000 rpm. Also featured are the new Wyco High-Speed Saw, Wyco Hole and Washer Cutters, the complete line of Wyco Angle Drilling Attachments and Flexible Shaft Accessories besides Wyco tools, vibrators, etc. Inquire through our

INFORM-A-GRAM KEY No. 533-E

SPECIAL MACHINE TOOLS DATA BOOK, explaining drilling, reaming, tapping, boring, facing, milling and honing, is a sturdy, looseleaf binder with 7 clearly visible, indexed sections published by W. F. & JOHN BARNES CO., Dept. T-7, Rockford, Ill. This book shows through photographs, drawings and pertinent production information how Barnes Unit-Type and Special Machines serve for a wide range of metal working operations. Practical machining ideas, suggesting more efficient and economical methods, are incorporated. The book's 7th section, Performance Data, provides actual field production accounts of metal working applications with W. F. & John Barnes' machines which perform better, easier, and quicker, at lower cost.

INFORM-A-GRAM KEY No. 80-E

PRECISION PRODUCTION TOOLS are fully described in Catalog 45 recently issued by the ACME TOOL CO., Dept. T, 196 Church St., New York 13, N. Y. Included among the tools shown are boring bars, carbide tools, air guns, flexible shaft machines, Meehanite angle and surface plates, and bench vises. Their swivel base milling machine vise is made in Master and Junior sizes. They are suitable for milling machines, drill presses or shapers.

INFORM-A-GRAM KEY No. 69-E

PRECISION PLASTIC COMPARATOR CHARTS, which enable the comparator to define and perform to the exceptionally close limits which can be measured by these machines, and afford new applications in production work and tool room, are highlighted in a descriptive 12-page Catalog, No. 44-2470, recently issued by the GAGE COMPANY DIVISION, Dept. T-4, Battle Creek, Mich. Inspection operations can be accelerated through their use because the readings are positive and can be read accurately without calculation or guess work. These Plastic Radii Charts are available in any size or shape

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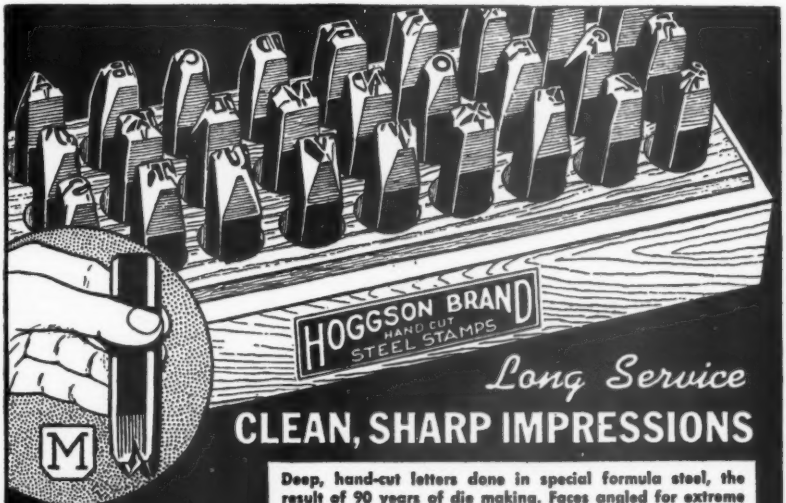

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PUBLICATION PREVIEWS

and for every model and make of optical comparator, contour projector, micro-projector or shadowgraph device. They are classified for easy reference by groups, usual standard magnifications and arrangements being shown and described. Special radii charts can always be furnished to order in any size, shape and arrangement desired.

INFORM-A-GRAM KEY No. 951-E

SINGLE-RAM BROACHING MACHINE. A four-page, two-color folder (Bulletin VAS-45) describing its standard line of improved single-ram broaching machines specifically designed for surface broaching is now available from COLONIAL BROACH CO., Dept. DJ, Box 37, Harper Station, Detroit 13, Mich. The machines are particularly suitable where high output combined with continuous high precision are desired. Aside from specifications, dimensions, and complete description of the standard line of machines which range from 5 tons capacity with a 42" stroke to 25 tons capacity with a 66" stroke, the bulletin includes a series of "action" shots depicting typical jobs for which this type of machine is particularly suitable. These jobs include simultaneous broaching of rounds and flats; broaching large surfaces; broaching external gear teeth by use of indexing tables, etc.; machining several pieces simultaneously; performing several broaching operations at one time on either one part or a group of similar parts cast en bloc; and machining all surfaces of a part on a single machine.

INFORM-A-GRAM KEY No. 26.5-E

HYDRAULIC HIGH-LIFT TRUCKS is the title of Bulletin 136 issued by LYON-RAYMOND CORPORATION, Dept. T-7, 1728 Madison St., Greene, N. Y. High-Lift Trucks, though weighing under 500 lbs, enable one man to pick up, move and position loads of up to and including 1000 lbs. They are constructed of welded tubular steel, mounted on Timken bearings and have platforms which remain rigid and level while they raise, hold or lower weights of ½ ton. Elevating tote boxes to convenient working heights, handling unwieldy objects, and setting heavy work on lathes are only a few jobs which can be easily accomplished with use of Lyon-Raymond High-Lift Trucks.

INFORM-A-GRAM KEY No. 374-E

MAGNI-RAY Illuminated Magnifying Glass is illustrated and explained in a recent folder published by GEORGE SCHERR CO., Dept. T-7, 200-B Lafayette St., New York 12, N. Y. Everything under the Magni-Ray appears enlarged in every detail, in true perspective,

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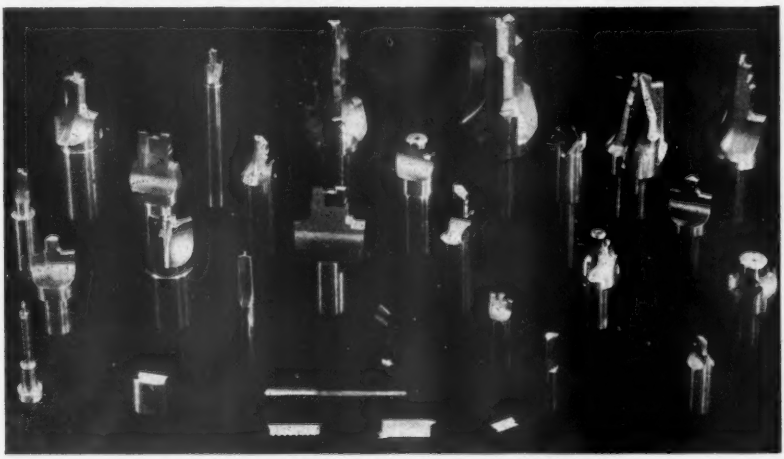

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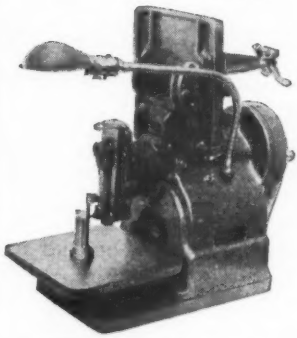
Uses a controlled downward movement with an adjustable stroke.



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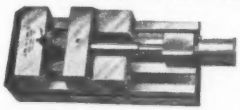

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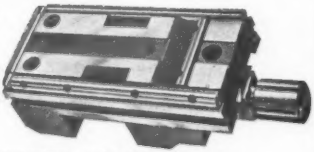

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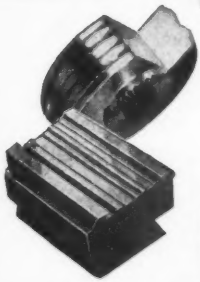

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OUTSTANDING ENGINEERING SERVICE AND CRAFTSMANSHIP

PUBLICATION PREVIEWS

flooded with intense, revealing light as effective as another degree of magnification. Magni-Ray is available in several models with various sized lenses and degrees of magnification power suitable for different applications. Each model has a substantial base, adjustable for height and position, available in either black or ivory crackle finish. The subject of inspection has no secrets from the Magni-Ray.

INFORM-A-GRAM KEY No. 490-E

MOTORS, AIR CONTROLLED, and their versatile uses are described in a bulletin recently issued by THE BELLOWS CO., Dept. T-9, 867 E. Tallmadge Ave., Akron 10, Ohio. The operations involving pulling, pushing or lifting, which can be handled by Bellows Air Motors faster, safer and better than by hand, are limited only by the ingenuity of their users. These simple, inexpensive pneumatic devices speed output and reduce production costs. Their elimination of physical effort and the consequent reduction in operator fatigue have caused more and better production, fewer accidents and more contented workers. Bellows Air Motors furnish perfectly controlled, fast flexible, positive and safe air power.

INFORM-A-GRAM KEY No. 839-E

FORM DRILLING is explained in a recent folder published by CONNER TOOL & CUTTER CO., Dept. T-6, 5555 Conner Ave., Detroit 13, Mich. Form drilling is the most economical for any round hole which is horizontal. The form drilling work range includes everything from the common, flat bottomed hole to the most intricate geometrical shape. Heretofore, the time saved and the uniform accuracy assured by form drilling could be gained only by use of expensive, specially designed tools. Conner has reduced all the engineering required for special form drills to the elementary factors of shank size and style, drill body length and the shape of the hole as shown on a part print. Upon receipt of these details, Conner Tool & Cutter Co. will gladly quote on your form drill requirements.

INFORM-A-GRAM KEY No. 944.5-E

PRECISION MACHINE & CUTTING TOOLS of Ex-Cell-O make are described in bulletin No. 27121, published by EX-CELL-O CORPORATION, Dept. T-5, Detroit, Mich. These 19 pages contain explanations of Ex-Cell-O's complete line of about 15 different products from Thread Grinders to Precision Parts, including Hydraulic Power Units and Diesel Fuel Injection Equipment. The quality of Ex-Cell-O Precision Products, consistently peerless performance of Ex-Cell-O machine tools with their ready adaptability to use for every job, needs no introduction to experienced ma-

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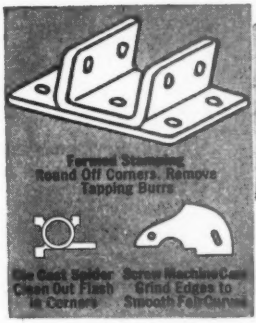
New circular explains, illustrates 18 ways in which the Mead Industrial Burring Machine saves time and money—also contains special Grit Guide. Every industrial plant needs this "Jack-Of-All-Trades" machine. Your burring can be done in "free time"—install these machines by every machine tool which leaves burrs. Grinds, finishes both outside and inside cut-out openings. Immediate delivery in most cases. Write for the informative Money-Saving circular now.



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Specialties Co.
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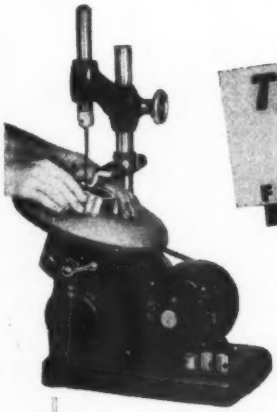

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FILES . . . SAWS . . . STONES

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An accurate, smoothly-operating machine that files, saws and stones the most intricate die shapes . . . eliminates tedious hand operations . . . reduces costs. It is quality-built for long, trouble-free service . . . hardened and ground shafts running in bronze bushings minimize wear. The holding chuck and clamping device provide perfect file alignment.

Write for descriptive literature.

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2501 N. Keeler Ave. • Chicago 39, Ill.
MANUFACTURERS OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS

PUBLICATION PREVIEWS

chinists and producers. For complete information concerning their specifications and notable features, bulletin No. 27121 is obtainable from Ex-Cell-O or use our postage free

INFORM-A-GRAM KEY No. 737.5-E

TUKON HARDNESS TESTER, which is designed for determination of Knoop hardness numbers under testing loads of from 25 to 3600 grams, is introduced in bulletin TK-45 by WILSON MECHANICAL INSTRUMENT CO., INC., Dept. T, 371 Concord Ave., New York 54, N. Y. This new device for indentation hardness testing, requiring minute, high precision penetrators and optical measurement of indentation, provides for extremely accurate hardness tests on very thin, brittle, shallow surfaces. For indentation, an area of a few thousandths of a square millimeter can be accurately located under the microscope.

INFORM-A-GRAM KEY No. 676-E

V-BELT MEASURING with the Flexoid V-Belt Matching Machine is explained in form FVM 124 published by THE SMITH POWER TRANSMISSION CO., Dept. T-5, 1545 E. 23rd St., Cleveland 14, Ohio. The Flexoid V-Belt Matching Machine compares and measures, in increments of .050", the exact length of industrial V-belts. This belt length is measured while the belt is under tension equal to that developed under drive conditions. The machine can also be used to determine the exact pitch length of a V-belt. The Flexoid always maintains indentical lengths in sets of V-belts, thus assuring their long life and superior performance.

INFORM-A-GRAM KEY No. E86-E

LEAK-PROOF AIR GUNS are photographically described in a 4-page leaflet published by AIR-WAY PUMP & EQUIPMENT CO., Dept. T-4, 571 W. Van Buren St., Chicago 7, Ill. The leaflet states that this is the only air gun with enclosed lever connected to the valve by a ball and socket joint. These Air-O-Chek Air Guns are extensively used in Automobile and Aircraft Factories, Tractor Plants, Foundries, Machine Shops, Textile Mills, Woodworking Plants and wherever air is used for blowing chips, dust and dirt.

INFORM-A-GRAM KEY No. F12-E

COMBINATION SLIDE and ROTARY TABLE. A recent development in machine tools, known as Model 700R Mastercraft Combination Slide and Rotary Table, is described in a folder issued by the F. & M. SALES CO., Dept. TJ, 1054 Cahuenga Blvd., Hollywood 38, Calif. This table replaces the Master Slide Table formerly built by this company. Two "T" slots, 5/8" wide for 1" x 1/2" "T" bolt heads, are cut across the face of the table at 90° apart, to provide clamping facilities. Provisions are made for table travel right to left and front to rear through dovetail slides and lead screws equipped with micrometer dials reading in .001". The table rotates through

AMES *Precision* BENCH LATHE

Known for 40 years as a precision lathe of the highest quality. Bed 36" long. Ball bearing headstock uses 1" capacity collets. Swing 8 3/8" over bed. Available with motor drive.

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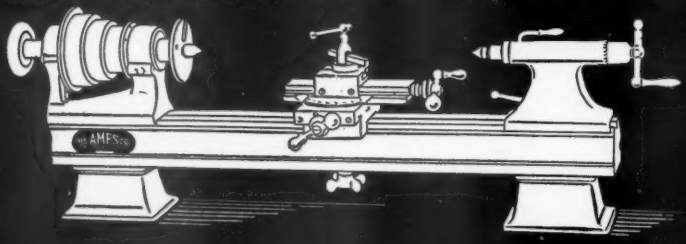

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Mounted on Cabinet Column

Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

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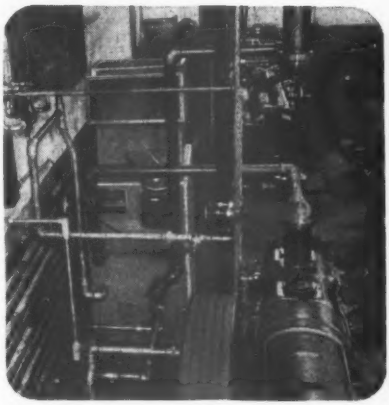
Niagara Aero After Cooler Protects Air Processes from Moisture Damage



Industries requiring dry compressed air need the Niagara Aero After Cooler. It provides cleaner, drier air for pneumatic tools, spray guns, sand and shot blast equipment, air cleaning nozzles and situations where air is introduced into materials in process.

The Niagara Aero After Cooler is based on the evaporative cooling principle. It does not consume cooling water and thus pays for itself quickly from savings in water bills. The patented "Balanced Wet Bulb" method assures the lowest air temperature, and controls exactly the jacket water temperature.

Write for Niagara Bulletins 96 and 98 for further information

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AIR ENGINEERING *EQUIPMENT*

PUBLICATION PREVIEWS

360° and settings to 1° intervals are made through a graduated scale. This table is a valuable auxiliary on the miller, drill press or lathe.

INFORM-A-GRAM KEY No. 287-E

SUPERIOR FLUXES for the welding, brazing and soldering of all metals are fully described in Catalog 44 published by the SUPERIOR FLUX CO., Dept. T-6, Public Square Bldg., Cleveland, Ohio. Twenty specialized types of Fluxes are highlighted. No. 6 is desirable for brazing and silver soldering both ferrous and non-ferrous metals, including Stainless Steel, High Carbon Steel, Monel, Nickel, Inconel, Copper, Beryllium-Copper. Aluminum Bronze. Brasses and Bronzes. No. 24 is a liquid-paste flux for bronze welding or brazing brass, bronze, copper and other copper base alloys and for brazing steel.

INFORM-A-GRAM KEY No. D62-E

SURFACE GRINDERS are pictorially described in literature available from the LA SALLE TOOL CO., Dept. T-9, 77 W. Washington St., Chicago, Ill. Bulletin 1043 features their No. 2AFE Hydraulic Surface Grinder which is equipped with a motor mounted spindle carried on ball bearings arranged to take annular and thrust loads. The spindle motor is of the drawn steel induction type, with a full ¾ hp capacity, 3200 rpm. Bulletin H 144 describes the No. 2HFE Hand Operated Surface Grinder which is built for either tool room or production grinding. This machine is designed to utilize a 7" diameter wheel with 1¼" hole.

INFORM-A-GRAM KEY No. F22-E

MODEL 41 PRINTER-DEVELOPER is explained in a recently issued folder by CHARLES BRUNING CO., INC., Dept. T-3, 4754 Montrose Ave., Chicago 41, Ill. With the Bruning Model 41, inexperienced operators can immediately turn out clear, perfect prints in easily understandable black and white. With an actual printing and developing width of 46", Model 41 exposes and develops prints from roll stock or cut sheets at speed of up to 6 fpm, depending on the transparency of the original, and has a mechanical speed of up to 7½ fpm. For those who find small capacity machines inadequate and high volume production units unsuitable, this new medium priced Bruning supplies prints in medium quantities.

INFORM-A-GRAM KEY No. 870-E

LOW TEMPERATURE WELDING ALLOYS are explained in a folder by the EUTECTIC WELDING ALLOYS CO., Dept. TA-1, 40 Worth St., New York 13, N. Y. EutecRods require unusually low bonding temperatures and less preheating of the parent metal, thus preventing distortion. EutecRod welds establish greater strength than brazing with less rejects and less need for machining and cleaning. The use of EutecRods insures greater all around economy. Herein featured are the various rods' specific applications, uses and specifications besides a full-page assortment chart for use of engineers, technicians

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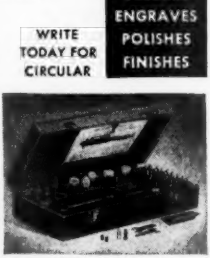
Up went volume so down goes price. This is exactly the same high-powered, high-speed PRECISE 35 that broke war-time records. Designed for industry, engineers marvel at its precision —at its tremendous power and sustained higher speeds under load. Outworks anything in the field—that's why PRECISE 35 is standard equipment for the U. S. Navy. Cased in durable, lightweight plastic; *guaranteed shockproof on AC or DC without ground wire.* Mounts in stand, vise, lathe, or milling machine; for close jobs attach COOLFLEX Flexible Shaft. Every plant, every maintenance department, every shop, ship, and plane needs PRECISE 35 with complete accessories.



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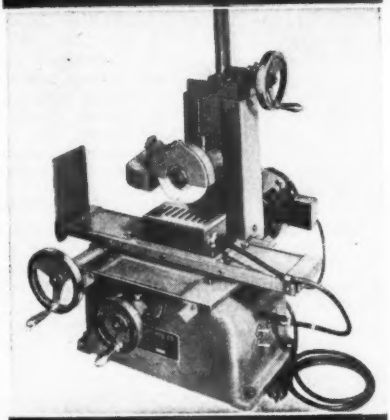
THE PRECISE 35

SANFORD



High-Speed BENCH SURFACE GRINDER

ACCURATE WITHIN .0001

A sensitive machine built to rigid standards of accuracy and workmanship specially designed *"For the job that fits in your palm."*

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for LAYOUT WORK of ALL TYPES . . . . . on ALL METALS

• Quickly applied with brush or cloth. • Dries instantly, ready for scribing. • Adheres perfectly to *any* clean, dry surface; no special preparation required. • Not affected by oil, water, coolants, etc.—yet readily removed with Pen-Blu Remover. • Will not blur, smudge, chip or peel. • Lines remain sharp and highly visible throughout *all* normal shop handling. • Low in cost, economical to use.

For full information on this NEW, BETTER layout dye, write for free descriptive bulletin.

PENINSULAR CHEMICAL PRODUCTS COMPANY
6795 E. NINE MILE RD. VAN DYKE, MICH.

and welders in selecting the proper rod for each job.

INFORM-A-GRAM KEY No. 81-E

AIR CYLINDERS & AIR CONTROL VALVES are featured in Catalog Section 50 by the GEROTOR MAY CORP., Dept. T-9, Logansport, Ind. Gerotor Cylinders are modernly designed for 150 lb air, 300 lb oil and water service. Their careful construction of proper material assures users of minimum leakage and efficient operation. Gerotor 4-Way Air Control Valves furnish positive control for double-acting cylinders. They are suitable for use with air pressures of up to maximum 150 psi. Their construction features provide for continuous, uniform air flow.

INFORM-A-GRAM KEY No. E13-E

DIALSET BORING TOOLS, "B" and "C" series, are explained in a folder issued by STATE MFG. & CONSTRUCTION CO., Dept. T-5, Franklin, Ohio. Setting the machine for production with the Dialset consists of making one trial cut and turning the dial once. Each graduation on the Dialset scale indicates .0005". The 50 such graduations provide for a full .025" adjustment in boring diameter. A turn of the dial secures the correct setting in the first piece of a production run. Precision of even less than .0005" is procurable by setting between graduations. Users of Dialset Boring Tools are assured of low-cost, high production performance of precision boring.

INFORM-A-GRAM KEY No. 138-E

BODY FLO MAGNETIC LATHE CHUCKS which provide new holding techniques for internal, external, face and taper jobs are pictorially described in a 4-page bulletin issued by MAGNETIC HOLDING DEVICES, INC., Dept. T-7, 2034 E. 22nd St., Cleveland 15, Ohio. The Body Flo Magnetic Lathe Chuck is preeminently suitable when used in combination with precision tool post grinders. Special Features include removable center plug to insert locating pilot and to provide a center cavity within the face of the chuck for internal grinding up to 1⅛" diameter.

INFORM-A-GRAM KEY No. 783-E

FORMULAS useful in calculating the weight of castings and definitions of terms used in materials testing are included in an unusual 44-page illustrated catalog just published by the BALDWIN LOCOMOTIVE WORKS, Dept. T-4, Cramp Brass and Iron Foundries Div., Philadelphia, Pa. The catalog gives the composition, applications and complete physical properties of thirty-two of the brass, bronze and iron alloys most generally used in industrial and engineering applications. The book should be valuable in the reference file of any engineer or executive in the industrial field.

INFORM-A-GRAM KEY No. 131-E

CRITERION *Boring Heads*

Original Accuracy *Maintained*

Noted for maintaining original accuracy over a longer period. Criterion Heads are smooth, compact, rigid. Parts subject to wear are hardened. Lead screw is hardened tool steel, with threads ground from solid after hardening. All heads have large, graduated dial. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3". ½" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

Lead Screw ground from solid AFTER hardening.

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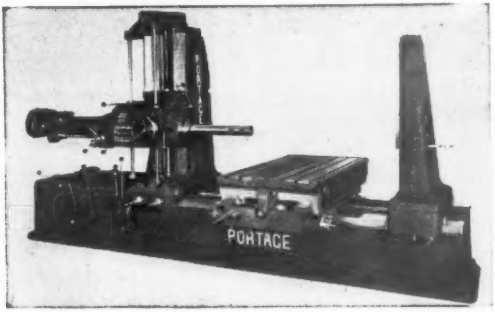
PORTAGE

4 INCH BAR HORIZONTAL BORING, DRILLING & MILLING MACHINE

ROTARY TABLES



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● Designed and built to meet the need for speed and accuracy demanded of today's production.

WRITE TODAY for fully illustrated bulletin giving detailed description of the many features of this Horizontal Boring, Drilling and Milling Machine. No obligation.

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BY "molecular absorption"

Rawhide PROTECTS

By momentarily storing the force of a blow and "slowing the punch," the coiled and compressed rawhide in C/R Hammers and Mallets (1st) takes the shattering crash out of powerful blows . . . prevents breaking, disfiguring or marring of products, machines and fine finishes. (2nd) eliminates recoil—ends the fatiguing bounce common to most mallets.

With a C/R Hammer you can use a lighter tool, still strike harder and more effectively; can accomplish more with less fatigue; because striking force is mono-directional with more carry through.

Molecular absorption (the storing of force conveyed through the tough interwoven, resilient hide fibres) converts velocity into effective thrust.

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PUBLICATION PREVIEWS

CAM-STAT TEMPERATURE CONTROLS which are fully adjustable over a wide range and are furnished with operating differentials running down to as low as 1° F have been recently announced by the PAUL HENRY CO., Thermal Div., Dept. T-4, 2037 S. La Cienega Blvd., Los Angeles 34, Calif. They are small, light, rugged, efficient and can handle substantial loads. Their complete line of control devices features a unique snap action arrangement which lends itself to unusually accurate control of temperature, pressure, humidity and mechanical displacement. Literature will be mailed on request.

INFORM-A-GRAM KEY No. B60-E

GRINDING WHEEL ACCESSORIES for Portable Tools are illustrated in a circular issued by AMERICAN EMERY WHEEL WORKS, Dept. T-3, Providence, R. I. Included are American Abrasive Accessories such as wheels, cones, straight and flaring cups for weld, blacksmith, pipe and structural work. Builders and contractors find constant use for American abrasive saws, cut-off wheels and rubbing bricks to rapidly cut or shape such materials as concrete, brick, tile and asbestos. Maximum production is assured from portable or flexible shaft tools for they are easily kept sharp on the job with these Accessories.

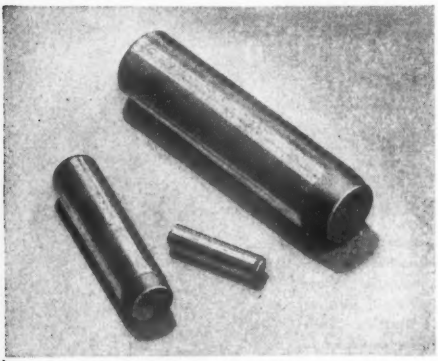
INFORM-A-GRAM KEY No. E83-E

A CENTRIFUGAL CLARIFIER, Model G-A, which is a new addition to their line of Sump Tank Cleaning Machines, is announced in a folder by W. R. CARNES, Dept. T-2, Madison 4, Wis. Carnes Centrifugal Clarifier, by extracting dirt, chips and sludge from cutting oils and coolants, assures their constant, clean flow at the cutting tool or wheel. In passing through the clarifier the coolant or oil is continually aerated, thus rancidity is retarded and the oils or coolants are always fresh and free from disagreeable odors. The G-A Clarifier, either alone or in conjunction with the available standard Sump Tank, can easily be adapted to any machine tool.

INFORM-A-GRAM KEY No. 728-E

PRECISION MACHINES are the subject of Form 636A which is published by PORTER-CABLE MACHINE CO., Dept. T-1, Syracuse 8, N. Y. The high-quality finishing done by Porter-Cable Machines improves and accelerates production. These machines for cutting, grinding and sanding include: Speedmatic Electric Hand Saws; Belt, Disc and Spindle Grinders; Back Stand Idlers; Wet & Dry Belt Surfacers; Take-About, Portable, Belt Sanders; and three types of floor finishing machines.

INFORM-A-GRAM KEY No. 14-E



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While commonly used in punch and die work, our Dowel Pins are also serving as locating pins and for many newly recognized purposes of convenience in machine assembly. Surfaces are precision-ground to a tolerance of plus or minus .0001" and treated with rust preventive. Our standard pins are ground .0002" over listed diameters; oversize pins are ground .001" over listed diameters. Special oversize pins are ground .002" over listed diameters. Supplied in 38 lengths from ⅜" to 6" and in diameters from ⅛" to 1".

We can fill your order immediately from stock in most any size and quantity. Available now! New, revised Die-Co Accessories Catalog.

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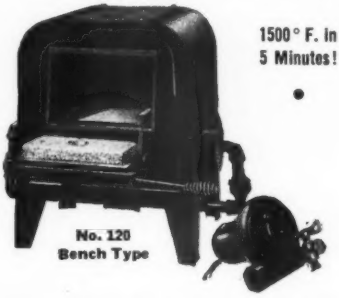
with *Quick Acting*
JOHNSON Furnaces

JOHNSON Hi-Speed No. 120

Reaches 2300° F. in 30 Minutes from a COLD START to Speed Up Heat-Treating Operations at Low Cost



Designed primarily for high-speed steels, this powerful Johnson No. 120 Bench Furnace is equally efficient for heat-treating ANY carbon steel tools, dies or small metal parts. Reaches desired operating temperature FAST to get the job done quickly and economically. Saves time and gas. Easily regulated with accuracy. Firebox 5 x 7¾ x 13½ lined with high temperature insulating refractory. Furnished complete with Carbofrax Hearth, G.E. Motor and Johnson Blower.

No. 120 Bench Furnace $104.50
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6
TIMES AS MANY THREADED HOLES
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TAPS

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"High-speed steel ground thread taps cost more than cut thread taps, but cost per tapped hole is much less, as when tapping at high speeds a ground thread tap will usually produce at least six times as many holes as a cut thread tap. It also requires less power. All conditions being equal, the ground thread tap requires about one-fifth the sharpening for the same number of tapped holes and is less easily broken."

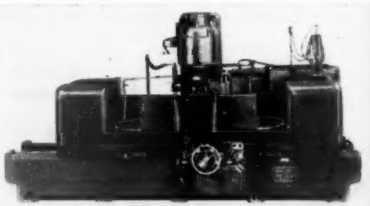
Commercial, Precision Special Ground Thread Taps

Send for catalog on Company Letterhead

HY-PRO TOOL CO.
New Bedford, Mass., U.S.A.

Duplex Rotary Surface Grinder

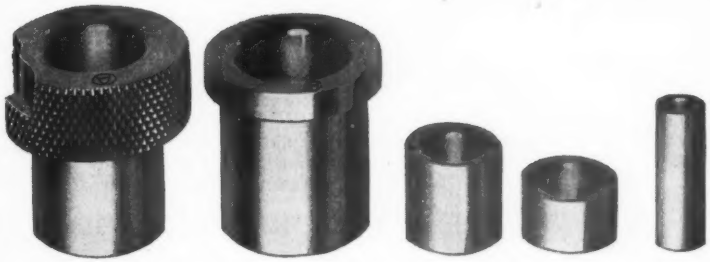
Grinding down time is practically eliminated by use of this new Hanchett No. 24 with its two rotary work tables, separately operated through electronic, fingertip control. Thus Hanchett No. 24 usually doubles production without



sacrifice of accuracy or fine finish and with no extra manpower. The two rotary, magnetic chucks, which eliminate practically all down time needed for cleaning and reloading, are rotated at variable speeds through remote controlled, DC motors attached to the carriage under side. Centralized push button controls are instantly reached by the operator. No. 24's electronic principles facilitate variable speed never before achieved. The segmental wheel, of improved and more accurate machine construction, produces fine finishes and is driven by a 25 hp, 900 rpm, built-in motor. One operator using a Hanchett accomplishes as much as that formerly done by two machines and operators. Hanchett No. 24 standard equipment includes: two 30" magnetic chucks; an 18" segmental wheel chuck with a set of grinding segments; all small motors and controls for head feed and carriage traverse; two drum type demagnetizing switches; one ammeter for the wheel motor; one floodlight; one wheel dresser; and a wet grinding system with two motor driven coolant pumps and tanks, wired complete. This grinder is a product of the Hanchett Mfg. Co., Dept. TD, Big Rapids, Mich. Answers to inquiries are easily available through use of our postage free

INFORM-A-GRAM KEY No. A22-E

DRILL JIG BUSHINGS



Get details on our **two** bushing standards —

Write for our bushing catalog today . . . no obligation!

ACME INDUSTRIAL COMPANY

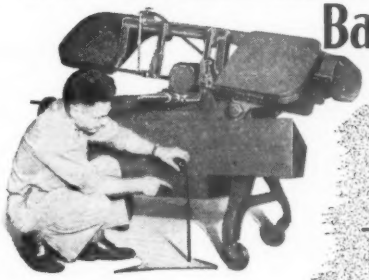
Makers of Standardised Jig and Fixture Bushings

206 N. Laflin St. Chicago 7, Ill. MONroe 4122

The ONLY Saw on which the coolant attachment is an integral part of the machine. A complete wet-cutting unit that has the SAME PORTABILITY —and the SAME OPERATING CONVENIENCE as the standard unit.

And—the ONLY machine with an enclosed saw frame that catches all drip on the back travel and eliminates all slop and mess.

The ONLY Metal Cutting Band Saw with BUILT-IN COOLANT SYSTEM -off the floor



Not a makeshift—but a properly designed coolant model saw that permits cutting accurately at highest production speeds, and on any metal.

Write for information or ask your dealer.

MACHINE TOOL DIVISION

KALAMAZOO TANK & SILO CO. -:- Kalamazoo 16, Mich.

In Canada — BRIDGE MACHINERY CO., Montreal

Kalamazoo Metal Cutting Band Saw

Accurate Spacing-

by the Thousandths

De-Sta-Co Arbor Spacers

Save time in setting up milling machine cutters, and wherever accurate spacing must be obtained and *maintained.*

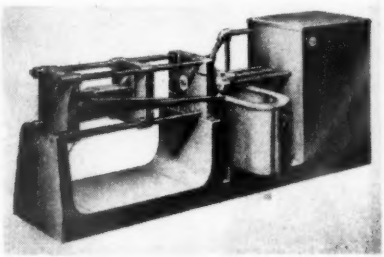
Made of metal. Not only for greater accuracy, but also because they will not be affected by heat or oil. And can be used over and over. Standard sizes from .001" to .125". Specials, cut from bar stock, in any length and ground to decimal.

Order a set of De-Sta-Co Spacers from your Mill Supply Distributor today.

DETROIT STAMPING CO.
Established Over 30 Years
344 Midland Ave. - Detroit 3, Mich.

New Harvill Die Casting Machine

The injection and operating devices usually found in only larger, more expensive machines are features of highly efficient Model HD-1AM1 for small to medium sized castings. It is the first introduced of four Harvill basic machines. Hand lever control of the movable platen renders the machine output dependent on the operator who, if efficient, will attain from 300 to 400 cycles



per hr without undue physical exertion. HD-1AM1 accommodates dies sized to 8" high and 12" wide though dies of greater width are usable if the die cavity arrangement provides for metal flow. The platen is overhung by oversize dies which, if of excessive weight, require auxiliary support. With a 14" maximum die thickness, an opening of 6¼" between die faces is provided for. Metal is injected by a horizontal ram such as is used in cold chamber equipment. The injection chamber is constantly supplied with molten metal by a gas or oil fired furnace, an integral machine part. The normal injection shot is 3 lbs of zinc, while 6.1 lbs of zinc is the maximum injection for oversized dies. When under 3 lbs of zinc, tin or lead is injected, a small piston exerts 1200 psi pressure. Minimum pressure of 600 lbs is exerted by a large piston which injects the maximum quantity. The injection ram is impelled by compressed air, the reservoir requiring 1 cfpm of air at 150 psi to sustain 400 cycles per hour. Auxiliary equipment or the "Complete Die Casting Package" is furnished with the machine by H. L. Harvill Mfg. Co., Dept. TJ, P. O. Box 335, Vernon, Calif.

INFORM-A-GRAM KEY No. F5-E

KEEP YOUR EYES ON THE JOB!

IF the job you do gives your eyes a hard workout Magni-Focuser is made for *you!* This *binocular* eye loop enables you to see an object *sharply magnified* with the comfort and clarity of normal vision. It increases accuracy — relieves eye-strain — reduces the chance of accidents. The shade shuts out all overhead and side distractions. Normal vision can be resumed at any time by just lifting the head slightly. *Allows free use of both hands.* Available in four different powers of magnification.

Most popular models $8.50 in U.S.A.

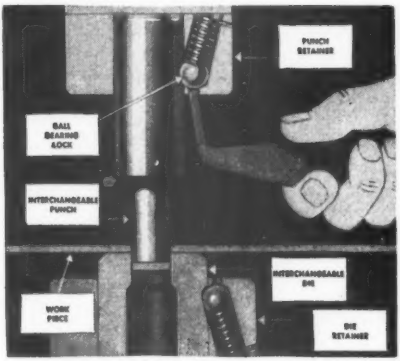
MAGNI-FOCUSER
Binocular Eye Loop

CARRY A "TWIN-READER" WITH YOU! Here's a dual-lens magnifier that *triples* the field of vision afforded by one-lens magnifiers. Provides third-dimensional vision—true perception of depth. Folds up compactly so you can carry it with you at all times. A handy eye-aid for inspecting precision work, reading fine print, and other hard-to-see jobs. Available in four powers of magnification; $9.50, in U. S. A.

Order from your Wholesale Supply House or write for name of nearest distributor

EDROY PRODUCTS CO., 480 LEXINGTON AVENUE, NEW YORK 17, N. Y.

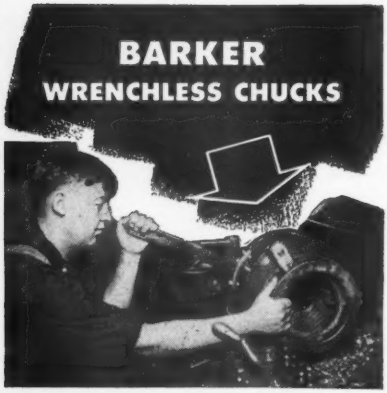
The Original Interchangeable Punch and Die



● Allied's R-B Interchangeable Punch and Die lowers costs in the metal working and plastic industries. Standard punches and dies carried in stock. Special shapes and sizes in any material made to your specifications with prompt deliveries. Send for large illustrated R-B catalog, now.

ALLIED PRODUCTS CORPORATION

Department 29A • 4634 Lawton Ave. • Detroit 8, Michigan



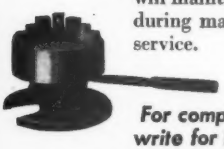
PRODUCE MORE AT LOWER COST!

Production goes up—and stays up—when Barker Wrenchless Chucks go on the job. These chucks are simple, rugged, self-contained units, that require no accessories, or outside source of power.

They are easy to install, and from the moment they are put in use they will deliver speedy, trouble-free service that pays liberal dividends—greater number of parts per hour, and lower cost per unit.

Precision built, they will hold to a tolerance of 1/1000" either way on round stock of uniform size. And, they will maintain such accuracy during many years of hard service.

Barker Wrenchless Chucks are made in two-jaw and three-jaw types; and as vises for milling machines, drill presses and similar purposes.

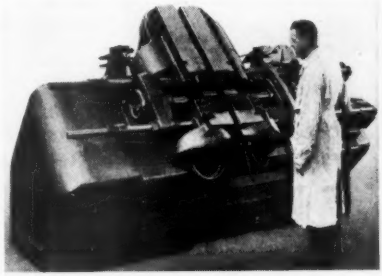


For complete information write for Bulletin No. 201.

THOMAS HOIST CO.
Chuck Division
20 So. Hoyne Ave., Chicago 12, Ill.

Butt-Flash Welding Machine

This new machine, in five standard sizes, is made by the Progressive Welder Co., Dept. TD, 3050 E. Outer Dr., Detroit 12, Mich. The electrical capacities range from 20 kva to 250 kva. It may be hand, air, hydraulic or motor actuated. The operation is manual; semi-automatic, meaning automatic flash and upset; or fully automatic which is initiated by pressing the platen traverse button. The larger machines are fully hydraulic operated through an installed, self-contained unit comprising: a rotor blade pump for platen traverse; a gear type pump for clamping work to the

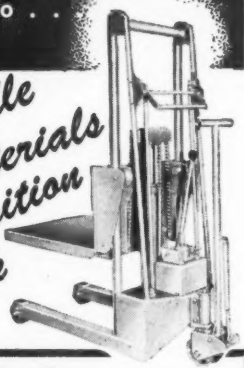


electrodes; and a pump which impels a direct action traverse feed piston and furnishes pressure for upsetting. The pumps are driven through high load capacity cone drive gears. The large, flat T slotted platens accommodate a wide range of interchangeable, standardized and/or special dies. On either stationary or movable platens adjustment for work length is accomplished by means of handwheels. In the three larger machines platens are positioned either on standard horizontal levels or at 45 degree angles. With either semi- or fully automatic control the platen travel may be reversed or stopped during any operational phase. Both the horizontal and vertical clamping fixtures, which are adjustable in two planes, and the tooling permit interchangeable welding of various sizes and types of work. An eight point current regulator on the transformer provides for from approximately 50% to 100% of maximum welding voltage adjustment.

INFORM-A-GRAM KEY No. 146.5-E

Here is an *Improved Way* to . . .

Handle Materials and Position Work



LYON-Raymond

Hydraulic

HIGH-LIFT TRUCK

Modern welded tube and formed plate construction, designed for strength, rigidity and safety. Weighs only half as much as an ordinary tiering truck of comparable capacity.

1. Lifts and Transports
Will pick up a skid load as handily as the usual type of lift truck. Easily transports capacity loads and can be steered into any space accommodating its width.

2. Supports
An adjustable support for overhanging work on drill presses, shears, cut-off machines, punch presses, etc. Serves also as a feed table for many operations. Secure floor lock.

3. Levels
Exact leveling for changing dies in presses. Ideal for transporting heavy die sets, fixtures and tools to and from storage bins.

4. Positions
Adaptable to positioning work in lathes, loading and unloading heavy work from other machine tools. Quicker and safer than with a helper and chain hoist.

5. Loads and Unloads
One man can do the work of many in loading and unloading freight. Especially convenient where shipments are delivered to curb or where docks are not available. Hydraulic operation assures ease and safety.

6. Tiers
An easily maneuvered truck, adaptable to tiering. Among other uses it serves as an adjustable work table for machining, assembly and general toolroom work.

DELIVERIES FROM STOCK
Write for BULLETIN 136

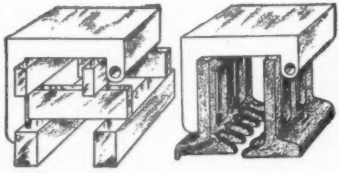
LYON-Raymond Corporation

464 Madison St., Greene, N. Y.

NEW "*MAGIC*" PARALLELS

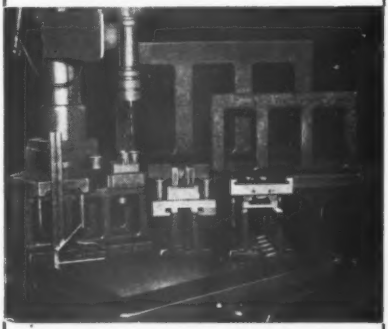
Save Time, Promote Accuracy in Tool and Die Shops . . . on Production Jobs Too

These handy tools do away with hunting around the shop for matched bars of steel to build a "pig pen" for elevating workpiece surfaces above base surface plates, benches or tables.



Old Fashioned Way — New Magic Parallel Way

Magic Parallels are cast of high grade iron, machined and ground, matched and paired. They are light, durable, accurate. Their shape makes them a pleasure to handle, promotes the habit of handling in pairs; and so they are always kept in pairs, ready for use. Unlike old style parallels they are never placed in the vise, used for anvils or found bent out of shape under heavy punch press jobs. The large base with dovetailing fingers prevents tipping. Narrow top surfaces provide easy accessibility between sections or between section and pins, bushing or shank, and simplify chip cleaning.



Available in four sizes: 4¼", 6¼", 10" and 16" high. May be used on drill presses, milling machines, planers, jig borers and other tool room machines as well as on many production jobs.

Reasonably priced; prompt delivery

Write today for circular and prices.

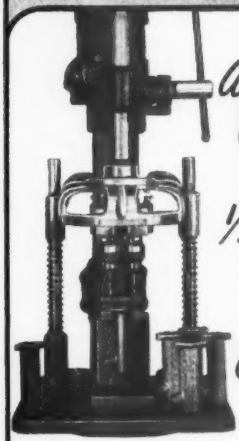
Agents Wanted

MAGIC CITY MACHINE TOOL COMPANY

Dept. TJ, 270 Hoyt Avenue
Muncie, Indiana

TWO SPINDLE *Adjustable* DRILL HEADS

Drill Two Holes At Once



✓ *Adjustable Centers from 1/2" to 6"*

✓ *Drill Capacity 0" to 5/8"*

Sleeve and overarm types ... in several sizes. Will double output of any single spindle drill press.

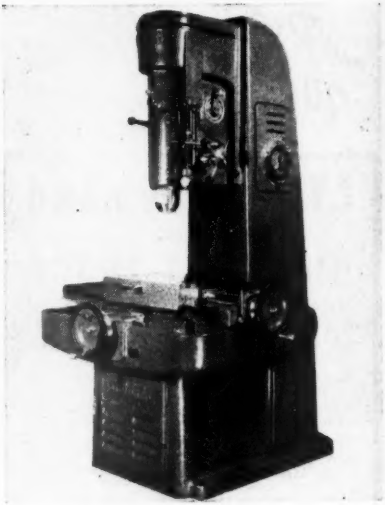
Quickly adjusted to desired drill centers from 1/2" to 6".

Send for bulletin

LINDERME
MACHINE & TOOL CO., INC.
12250 COYLE AVENUE
DETROIT 27, MICHIGAN

Autometric Boring Machine

A wide variety of precision boring jobs is easily handled by Model C Milwaukee. Its table, with a working surface of 14" x 22½", is positioned in 10ths of or in inches through setting mechanical counters at 0 in the initial setup. The table travels 12" transversely and 18" longitudinally at a rate of .2000" per revolution of 5-pitch pre-



cision measuring screws. Their lead is accurate to within .0001 per in. and to .0002 per ft. The measuring screws are equipped with large diameter micrometer dials and verniers graduated on each half of the periphery from 0 to 100. Thus they are operated as simply as with 10-pitch screws. From table top to spindle nose, the maximum dimension is 17". Spindle speeds are infinitely variable from 50 to 2500 rpm. The quill, which travels 11" vertically, is rapid traversed by a ¼ hp motor and has eight feeds of from .0005" to .0148" per revolution of the spindle driven by a 1 hp motor. All alignments which affect the workpiece accuracy are held to a non-cumulative .0002" per ft. Queries will be answered by the makers, Kearney and Trecker Products Corp., Dept. TD, Milwaukee 14, Wis., or use our *INFORM-A-GRAM KEY No. 592.5-E*

C-F POSITIONERS

permit progressive automatic and hand welding

A "double production line"—in a 30 ft. square space handles all of the progressive steps of building up 2 sizes of large turbine gears simultaneously.

Four C-F Positioners are grouped radially around one automatic welding machine—2 No. 12s (1,200 lb. capacity) in diagonally opposite corners, 2 No. 140s (14,000 lb. capacity) in the other corners. With this arrangement, the single automatic welding machine can serve all 4 positioners and is used for all peripheral welds on the weldments. For this operation, the positioner rotates the tilted weldment under the electrode at any desired speed from 0 r.p.m. up. While the automatic welding machine is busy on one weldment, 3 welders are completing the hand welding operations on the other 3 C-F Positioners, which under push button control, turn and tilt weldment to any desired position permitting all welds to be easily made "down hand".

CULLEN-FRIESTEDT CO.

1316 S. Kilbourn Avenue **Chicago 23, Ill.**

SEND FOR

The facts outlined in this booklet are taken from hundreds of actual cases showing the surprising variety of tools which can be improved by modern treatments. Among the several processes mentioned are:

"SILVER FINISH" — which is clean, bright hardening . . . no oxidation or scale.

"NUSITE"—starts with soft high-speed steel and means harder, tougher cutting tools.

"AD-LIFE"—a combination of supplementary treatments to improve hardened finished tools . . . even new ones . . . no rehardening is required . . . no danger of fracture or distortion.

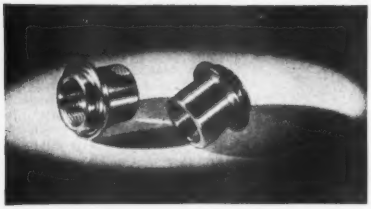
What manufacturers of tools, airplanes, trucks, gears, steel molds, food machinery, electrical devices, and many other fields did to improve tool quality and life is told.

PERFECTION TOOL & METAL HEAT TREATING CO.

1740-58 WEST HUBBARD STREET CHICAGO 22, ILL.

PRECISION PARTS

"SEE" FOR SEA DOGS



Ace turned-out this particular lens-mount from print to finished product. From stainless-steel bar-stock, Ace machined the blank, tapped a fine-class thread, and thread-ground the O.D. on both sides of the flange, concentric to the inside tapping. Delicate precision . . . accuracy throughout. The entire part was checked on go and no-go gauges again and again throughout each operation to insure concentricity.

Ace is a pioneer in this ever-increasing accuracy which industrial demands have taught to mass-production. Here, under one roof, is a source of supply for small parts or assemblies which call for stamping, machining, heat-treating, or grinding. And Ace offers the modern ingenuity and carefully controlled production you need in current peacetime conversion. Send sketch, sample, or blueprint for quotation.

ACE
TRADE MARK

ACE MANUFACTURING CORPORATION

for Precision Parts

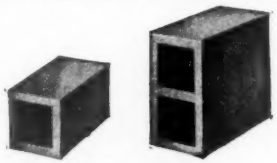
1217 E. ERIE AVE., PHILADELPHIA 24, PA.

DEPENDABLE ACCURACY

CHALLENGE PARALLELS

SOLID *and* BOX

- **Made the Challenge Precision Way this Surface Plate Equipment is especially useful for setting and leveling to parallel and exact height for checking and inspection.**
- **Only fine-grained, special analysis semi-steel goes into the castings that are precision ground and specially heat-treated.**
- **SOLID PARALLELS are made in 18 Sizes. From ¼x⅝x6 inches to 1¼x2x12 inches.**
- **BOX PARALLELS are made in 18 Sizes. From 1½x2x4 inches to 12x12x24 inches.**



We Rescrape and Regrind Surface and Layout Plates — Write for Details of this Service.

537

Challenge

THE CHALLENGE MACHINERY CO.

GRAND HAVEN, MICHIGAN

SHOP AIDS

for YOU and YOUR JOB!

Use our postage-free Inform-a-Gram for your requests.

101 GRINDING QUESTIONS ANSWERED, Third Edition. This booklet is a practical aid in solving many of the customary grinding problems. It is composed of general subject headings such as: Truing and Dressing; Balancing; Grinding Operations, including Surface, Cylindrical, Centerless, Internal, Gear, Thread, Tool and Cutter; Cutting Off; and Grinding Fluids. Listed under each main topic are the questions pertaining to it which have occurred in actual field experience. The questions have been carefully selected and answered by Allen Steele from his lifelong experience in development, manufacture and application of grinding wheels.

Only five months after its publication, copies have been requested by more than a thousand manufacturers of autos, aircraft, business machines, electrical appliances, and vocational schools, who use it as a training text.

To help solve your special grinding problems, you are invited to send the author your questions, without obligation of any sort. All such questions will be answered by mail. Convenient write-in forms are provided at the back of the booklet.

The author, Allen Steele, manages the Dayton Grinding Wheel Division of Simonds Worden White Company, Dept. TJ, Negley Place, Dayton, Ohio.

INFORM-A-GRAM KEY No. D37-E

MACHINE TOOL GUIDE. This book saves valuable time which would otherwise be lost in searching for individual manufacturer's service manuals and catalogs. Referring to them is often an inconvenience for mechanical and tool engineers and designers who have long felt the need for a reference work such as the Machine Tool Guide. Presented herein are drawings, dimensions, specifications, and all important data on machine tools and machines such as: Automatics; Boring, Broaching, Contour, Drilling, Hobbing, Milling and Tapping Machines; Duplicators; Gear Cutters; Grinders; Lathes; Presses; Shapers; and Slotters. Sixty-one foremost manufacturers of the country have co-operated in the preparation of these 780 pages of factual material. Although in its first edition, a reference book like this could not be complete, it is hoped that new facts and drawings will be available for each edition. The editors will appreciate suggestions from all the text's users and purchasers concerning its development and improvement. Bound in a hard cover with binding posts, this 8½" x 11" book has all the advantages of a loose leaf binder plus strength and durability needed for years of hard use. Published by The American Technical Society, Drexel Ave. at 58th St., Chicago 37, Ill., and priced at $7.50 per copy.

EMERGENCY REPAIR OF MAGNESIUM PARTS BY GAS WELDING is covered in Technical Memorandum No. 10 issued by the Dow Chemical Co. Magnesium parts which have been broken or cracked usually can be sufficiently repaired by gas welding to enable the part to be placed back into use. Generally speaking, such repair should be considered only as a temporary measure until a replacement part can be obtained. This is particularly true in the case of repairs made on magnesium castings. The emergency welding of magnesium parts often requires deviation from normal practice in order that the parts may be placed back into service quickly. Examples of such deviations are: The use of multiple bead welds, the welding of sections that are impossible to thoroughly clean, the welding of cast metal, and inadequate cleaning of welds due to lack of facilities. Proper procedures for making repairs of this nature are treated in technical Memorandum No. 10 which is available from Magnesium Division, The Dow Chemical Co., Dept. TD, Midland, Michigan, or by use of our postage free

INFORM-A-GRAM KEY No. 275-E

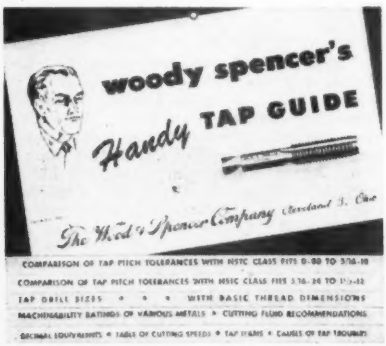
"WHAT THE FOREMAN NEEDS FOR SUCCESS" and "HOW TO TRAIN YOUR ASSISTANTS" are the titles of two new handbooks

published by the National Foremen's Institute, Inc. The first deals with the qualifications essential to make a successful foreman, most of which can be acquired by cultivation if they are not already a part of his make-up. Because working with people and getting people to work together is 75% of a foreman's job, then his know-how of the job is 25%, although he may have to be a production expert. Personality, knowledge of workers and proper leadership are subjects developed as instructions to foremen.

The second book points out methods to use with assistants to develop them into self-reliant workers. The wise foreman or supervisor will have well trained assistants to relieve him of details or ready to take his place when a promotion is offered. This subject is developed by five simple steps, by Richard W. Wetherill.

These handbooks are available at 25¢ per copy from the National Foremen's Institute, Inc., Deep River, Conn.

"HANDY TAP GUIDE" developed by Wood and Spencer Company is designed to convey all the general data and information possible to assure "The Right Tap at the Right Time". The engineering data required to meet a specific tapping problem must, of course, be given by the engineering department after a study of complete details of a given job. Therefore a wide scope of information is included in the guide covering: comparisons of tap pitch tolerances with N S T C fits; basic thread dimensions; tap drill sizes, with formula for determining drill size necessary to produce required percent thread; machinability ratings of various metals by indentification numbers; cutting fluid recommendations; recommended cutting speeds; tap terms; decimal equivalents and a few of the common causes of tap troubles. The guide is 10" x 11" and is designed to be hung on the wall for easy reference, in tool cribs, at or near tapping operations or in engineering departments. It will also lie flat on drawing boards or desks.


woody spencer's
Handy TAP GUIDE
The Wood & Spencer Company Cleveland 3, Ohio
COMPARISON OF TAP PITCH TOLERANCES WITH NSTC CLASS FITS 0-80 TO 3/16-18
COMPARISON OF TAP PITCH TOLERANCES WITH NSTC CLASS FITS 1/4-20 TO 1"-12
TAP DRILL SIZES • • • WITH BASIC THREAD DIMENSIONS
MACHINABILITY RATINGS OF VARIOUS METALS • CUTTING FLUID RECOMMENDATIONS
DECIMAL EQUIVALENTS • TABLE OF CUTTING SPEEDS • TAP TERMS • CAUSES OF TAP TROUBLES

This guide is available to anyone interested in tapping by requesting it on your company stationery from The Wood & Spencer Co., 1938 E. 61 St., Cleveland, Ohio, or use our postage free

INFORM-A-GRAM KEY No. 531-E

A NEW SPANISH-ENGLISH DICTIONARY of technical terms applicable to the Tool & Die Industry has just been published by the Greenfield Tap and Die Corp. The first half of the book has the Spanish words arranged alphabetically in the left-hand column with the English translation in the right-hand column. The last half has the English words arranged alphabetically with their Spanish translation. This book should be helpful to those who are contemplating doing business with any of the Spanish-speaking nations.

Copies are available on request from Greenfield Tap and Die Corp., Dept. TJ, Greenfield, Mass., or use our postage free

INFORM-A-GRAM KEY No. 108-E

A NEW LINE OF "PRECISION" BROWN & SHARPE COLLETS and FINGERS has been announced by the General Die and Stamping Co., Dept. TJ, 262 Mott Street, New York 12, N. Y. The popular No. 00 and No. 10 collets and fingers are now available for immediate delivery in all round sizes in 64th" steps. These precision collets and fingers are manufactured from a specially developed tool steel, and considerable research has been done to achieve a lasting spring quality. A new catalog sheet is ready and may be had upon request from the company.

INFORM-A-GRAM KEY No. 706-E

COMPLETE 16MM FILM ON "SWAGING" RELEASED. An exceedingly interesting and informative motion picture film on the subject of "Swaging" is now available to educational, employer and employee groups throughout the world.

This 16MM film with sound commentary has been prepared in English, French, Russian and Spanish for preliminary distribution. Its 26-minute run gives a popular Hollywood style portrayal of the many applications of the "swaging process" in today's mass production methods for pointing, shaping, and attaching fittings to bar, cable and tube.

It features the one operation—fast—precision—no scrap—forming type of manufacture which played such a prominent part in the establishment of wartime production records.

Steel—including stainless—copper, aluminum and even wood products are shown by the film to be included within the processing scope of the Swager and its derivatives.

The movies have been made available without charge by the Standard Machinery Company, Dept. TJ, Providence, R. I., where

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Carborundum Co., The
Mead Specialties Co.
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Wells Sales Corp.

ABRASIVE POWDERS
Ace Abrasive Laboratories

AIRCRAFT PARTS—Precision
Noble & Stanton, Inc.
Pipe Machinery Co., The
Saw-Way Industries
Star Machine & Tool Co.

AIRCRAFT SERVICING & PRODUCTION EQUIPMENT
Lyon-Raymond Corp.

ALLOYS
Cerro de Pasco Copper Corp.
Gage Co. Division

ASSEMBLING MACHINES — Automatic
Kimmer & Adams Co., The

AUTOMATICS—Rotary for Burring, Brushing, Buffing, etc.
Hammond Machinery Builders, Inc.

BALLS—Carbide
Kennametal, Inc.

BAND SAWING MACHINERY
Tannewitz Works, The

BAND SAWS
Johnson Mfg. Corp.

BARS—Boring (See Boring Bars)

BARS—Steel
Ajax Steel & Forge Co.
Carpenter Steel Co., The
Latrobe Electric Steel Co.

BELTS—Endless
Gorton Machine Co., George
Preis Engraving Machine Co., H. P.

BENCH BLOCKS—Duplex
Challenge Machinery Co., The

BENCH MACHINERY—Precision
Ames Co., B. C.

BENCH PLATES (See PLATES—Bench)

BENCHES—Work
Challenge Machinery Co., The

BENDERS
Lewthwaite Machine Co., T. H.
O'Neil-Irwin Mfg. Co.

BINS—Assembly & Storage
Stackbin Corp.

BITS—Tool (See TOOL BITS)

BLADES—Band Saw (See BLADES—Hack & Band Saw)

BLADES—Cutting Off
Allegheny Ludlum Steel Corp.
Armstrong Bros. Tool Co.
Carborundum Co., The

BLADES—Hack & Band Saw
Armstrong-Blum Mfg. Co.

BLANKS—Milling Cutter
Gorton Machine Co., George

BLOCKS—V (See V-BLOCKS)

BLOWERS
Gorton Machine Co., George
Johnson Gas Appliance Co.
Niagara Blower Co.
Strong, Carlisle & Hammond Co.

BOLTS—Eye & T Slot
Armstrong Bros. Tool Co.
Boyar-Schultz Corp.
Die Supply Co.
Gorton Machine Co., George

BOLTS—Socket Head Stripper
Holo-Krome Screw Corp., The

BOLTS—Stripper
Danly Machine Specialties, Inc.
Die Supply Co.
Holo-Krome Screw Corp.

BORING—Attachments
Rusnok Tool Works

BORING BARS
Acme Tool Co.
Armstrong Bros. Tool Co.
Clark Co., Robert H.
Enterprise Machine Parts Corp., The
Gairing Tool Co., The
Globe Products Mfg. Co.
Gorton Machine Co., George

BORING HEADS
Acme Tool Co.
Criterion Machine Wks.
Gorton Machine Co., George
Super Sales & Engineering Co.

BORING MILL—Horizontal
DeVlieg Machine Co.
Portage Machine Co.

BORING TOOL HOLDERS
Armstrong Bros. Tool Co.
Clark Co., Robert H.

BORING TOOL PARTS
Armstrong Bros. Tool Co.

BORING TOOLS
Armstrong Bros. Tool Co.
Bokum Tool Co.
Firth-Sterling Steel Co.
Gairing Tool Co., The
Gorton Machine Co., George
Wesson Products Co.
Wheel Trueing Tool Co.

BOX TOOLS
Boyar-Schultz Corp.

BRAKES
Cincinnati Shaper Co.
O'Neil-Irwin Mfg. Co.

BROACH—Holders
American Broach & Machine Co.
Colonial Broach Co.
U. S. Broach Co.

BROACH—Pullers
American Broach & Machine Co.
Colonial Broach Co.

BROACHES
American Broach & Machine Co.
Colonial Broach Co.
Continental Tool Wks., Div. of Ex Cell-O Corp.
U. S. Broach Co.

BROACHING FIXTURES
American Broach & Machine Co.
Colonial Broach Co.
U. S. Broach Co.

BROACHING MACHINES
American Broach & Machine Co.
Builders Iron Foundry
Cincinnati Milling Machine Co., The
Colonial Broach Co.

BURNERS—Gas & Oil Furnace
Johnson Gas Appliance Co.
Strong, Carlisle & Hammond Co.

BURNISHING TOOLS
Boyar-Schultz Corp.

BURRING MACHINES
Mead Specialties Co.

BURRING TOOLS
Nobur Mfg. Co.

BURRS—Rotary
Gorton Machine Co., George

BUSHINGS—Collet
Gorton Machine Co., George

BUSHINGS—Die
Danly Machine Specialties, Inc.
Die Supply Co.

BUSHINGS—Drill
Accurate Bushing Co.
Acme Industrial Co.
Colonial Bushings, Inc.
Universal Engineering Co.

CALIPERS
American Measuring Instrument Corp.
Lufkin Rule Co.

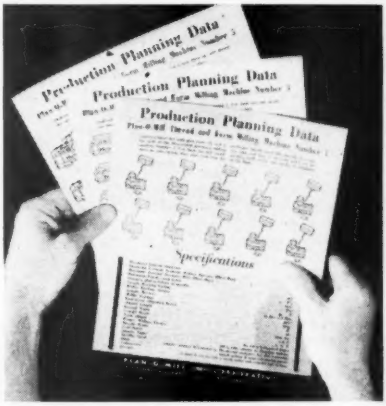
SHOP AIDS

this and a short U. S. Office of Education movie on swaging were filmed. The educational film has been incorporated in the complete "Standard" film.

Copies of the film can be reserved for local showings with Maxwell-Roney, 35-36 76th Street, Jackson Hts., L. I., N. Y.; The Swind Machinery Company, Philadelphia, Pa.; Wm. K. Stamets Company, Pittsburgh, Pa. and Cleveland, Ohio; Neff Kohlbusch & Bissell, Inc., Chicago, Ill.; Smith Booth Usher & Co., Los Angeles, Calif.; and for export showings with Mr. Stanley H. Rose, 1111 S. Ferry Bldg., New York City.

INFORM-A-GRAM KEY No. F30-E

PRODUCTION PLANNING DATA. Production planning cards and data sheets, of value to industrial executives and engineers, have been developed by the Plan-O-Mill Corp. They are offered for use in reconversion in providing for expanded facilities, or in new building plans. Building contractors and architects, as well as production executives, will find these cards useful for planning purposes.

The cards and data sheets are designed to simplify the layout of production flow by providing scale machine models which can be placed on the factory floor plan and arranged to meet particular production or space requirements. A set of three cards is offered, covering three different Plan-O-Mill models. Each card reproduces eight to twelve plan views of the model, scaled ¼" = 1', together with specifications of the machine. These plan views can be cut out of the card and used as

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CAMS
Gage Co. Division
Hartford Special Machinery Co., The
Newton Mfg. Co.
Slewek Tool Div. of Domestic Industries, Inc.

CARBIDE
Allegheny Ludlum Steel Corp.
Bokum Tool Co.

CARBIDE TOOLS AND BLANKS
Allegheny Ludlum Steel Corp.
Carboloy Co., Inc.
Firth-Sterling Steel Co.
Kennametal, Inc.

CARBIDE TOOLS—Sintered
Allegheny Ludlum Steel Corp.
Firth-Sterling Steel Co.

CARBURIZERS—Liquid & Solid
Park Chemical Co.

CASTINGS—Air & Oil Hardening, Cast-to-Shape
Allegheny Ludlum Steel Corp., Forging & Casting Div.

CASTINGS—Nitri-cast-iron
Allegheny Ludlum Steel Corp., Forging & Casting Div.

CENTERS
Gorton Machine Co., George

CENTERS—Live
Acme Tool Co.
Sturdimatic Tool Co.

CERROBASE (Also see Alloys)
Cerro de Pasco Copper Corp.

CERROBEND (Also see Alloys)
Cerro de Pasco Copper Corp.
Die Supply Co.

CERROSAFE (Also see Alloys)
Cerro de Pasco Copper Corp.
Die Supply Co.

CHAMFERING MACHINES
Builders Iron Foundry

CHAMFERING TOOLS
Nobur Mfg. Co.

CHARTS—Plane, Spherical, Compound
Needham, E. H.

CHECKING DEVICES
Electrix Corp.

CHESTS—Tool
Scherr Co., Inc., George

CHROMIUM PLATING
Hartford Chrome Corp.

CHUCKS—Collet
Allison Tool & Engineering Co.
Erickson Tools
Gorton Machine Co., George
Hardinge Brothers, Inc.
Universal Engineering Co.

CHUCKS—Drill
Gorton Machine Co., George
Jacobs Mfg. Co., The
Lee Co., K. O.

CHUCKS—Lathe
Acme Tool Co.

CHUCKS—Magnetic
Acme Tool Co.
Rockford Magnetic Products Co.

CHUCKS—Wrenchless
Thomas Hoist Co.

CLAMPS
Armstrong Bros. Tool Co.
Cincinnati Tool Co., The
Danly Machine Specialties, Inc.
Detroit Stamping Co.
Gibson Co., The William D. (Div. of Associated Spring Corp.)
Howell Clamp Co.
Knu-Vise, Inc.
Mead Specialties Co.
Slewek Tool Div. of Domestic Industries, Inc.

CLAMPS—Die
Danly Machine Specialties, Inc.

CLAMPS—Jig
Products Engineering Co.

CLAMPS—Toggle
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Detroit Stamping Co.
Knu-Vise, Inc.

CLAMPS—Toolmakers Parallel
Lufkin Rule Co.

CLEANERS—Metal
Park Chemical Co.

CLINOMETERS
Acme Tool Co.

CLIPS
Gibson Co., The William D. (Div. of Associated Spring Corp.)

COLLET INDEX FIXTURES
Hardinge Brothers, Inc.
Zagar Tool, Inc.

COLLETS
Allison Tool & Engineering Co.
Bellows Co., The
Erickson Tools Co.
General Die & Stamping Co. (Precision Collet Div.)
Gorton Machine Co., George
Hardinge Brothers, Inc.
Rivett Lathe & Grinder, Inc.

COMPARATOR CHARTS
Gage Co. Division
Universal Engraving & Colorplate Co., Inc.

COMPARATORS
Fish-Schurman Corp.
Scherr Co., Inc., George
Trico Products Corp.

COMPARATORS—Optical
Fish-Schurman Corp.

CONTOUR METAL WORKING MACHINES
DoAll Company, The

CONTROLS—Air
Tomkins-Johnson Co., The

COOLANT SYSTEMS
Gray-Mills Co.

COOLERS—Air
Niagara Blower Co.

COOLING SYSTEMS—Spot Welder
Gray-Mills Co.

CORE BITS
Wheel Trueing Tool Co.

COUNTERBORES
Acme Tool Co.
Bokum Tool Co.
Carboloy Co., Inc.
Cleveland Twist Drill Co.
Continental Tool Wks., Div. of Ex-Cell-O Corp.
Firth-Sterling Steel Co.
Gairing Tool Co., The
Genesee Mfg. Co., Inc.
Mohawk Tool Co.
National Twist Drill & Tool Co.
Putnam Tool Co.
Wesson Products Co.

COUNTERBORES—Adjustable
Clark Co., Robert H.

COUNTERBORES—Special
Detroit Reamer & Tool Co.

COUNTERSINKS
Continental Tool Wks., Div. of Ex-Cell-O-Corp.
Gairing Tool Co., The
Severance Tool Industries, Inc.
Wesson Products Co.

CRANES
Cullen-Friestedt Co.

CUT-OFF MACHINES
Challenge Machinery Co., The
Delta Mfg. Co.

CUTTERS—Boring
Gairing Tool Co., The
Gorton Machine Co., George

CUTTERS—Deburring
Severance Tool Industries, Inc.

CUTTERS—Diamond Glass (See DIAMOND GLASS CUTTERS)

CUTTERS—Die Sinking
Gorton Machine Co., George
Tomkins-Johnson Co., The

CUTTERS—Engraving
Gorton Machine Co., George
Preis Engraving Co., H. P.

CUTTERS—Fly
Clark Co., Robert H.

CUTTERS—Gasket
Clark Co., Robert H.

CUTTERS—Hand Power
Lewthwaite Machine Co., T. H.

CUTTERS—Hard Carbide
Allegheny Ludlum Steel Corp.
Firth-Sterling Steel Co.
Ford Mfg. Co., Inc., M. A.
Gairing Tool Co., The
Gorton Machine Co., George
National Twist Drill & Tool Co.
Pipe Machinery Co., The
Putnam Tool Co.
Severance Tool Industries, Inc.
Super Tool Co.
Tomkins-Johnson Co., The
Wesson Products Co.

CUTTERS—Hole—Adjustable
Clark Co., Robert H.

CUTTERS—Serration
U. S. Machine Tool Mfg. Co.

CUTTERS—Spline
U. S. Machine Tool Mfg. Co.

CUTTERS—Thread Milling
Armstrong Bros. Tool Co.
Gairing Tool Co., The
Pipe Machinery Co., The
Sossner Tap & Tool Co.
U. S. Machine Tool Mfg. Corp.
Wesson Products Co.

CUTTERS—Wire Rope
Lewthwaite Machine Co., T. H.

CUTTING TOOLS—Cemented Carbide
Allegheny Ludlum Steel Corp.
Wesson Products Co.

CUTTING TOOLS—Special
Alvord-Polk Tool Co.
Continental Tool Wks., Div. of Ex-Cell-O Corp.
Don Gage Co.
Masterform Tool Co.
National Twist Drill & Tool Co.
Super Tool Co.
U. S. Machine Tool Mfg. Corp.
Zimmerman Packing Co.

CYLINDERS—Air
Anker-Holth Mfg. Co.
Mead Specialties Co.
Tomkins-Johnson Co., The

CYLINDERS—Hydraulic
Tomkins-Johnson Co., The

DEMAGNETIZERS
Acme Tool Co.
Alofs Mfg. Co.

DESIGNING AND DRAFTING
Bunell Machine & Tool Co.

DESIGNING & ENGINEERING
McKinney Tool & Mfg. Co.

DIALS—Etched Plastic
Eastern Etching & Mfg. Co.

DIAMOND BORING TOOLS — (See BORING TOOLS—Diamond)

DIAMONDS—Industrial
Meyers Co., Inc., W. F.

DIAMOND HONES
Carborundum Co.
Fish-Schurman Corp.

DIAMOND POWDERS
Ace Abrasive Laboratories

DIAMOND TOOLS
Diamond Tool Co., Not Inc.
Fish-Schurman Corp.
Koebel Diamond Tool Co.
Smit & Sons, Inc., J. K.
Wheel Trueing Tool Co.

DIE CASTING MACHINES
Lester-Phoenix, Inc.

DIE CENTERS—Hard Carbide
Firth-Sterling Steel Co.

DIE FILING MACHINES
Illinois Tool Works
Milwaukee Chaplet & Mfg. Co.
Oliver Instrument Co.

DIE HANDLING TRUCKS
Hamilton Tool Co., The

DIE MAKERS' SUPPLIES
Acme Industrial Co.
Carboloy Co., Inc.
Continental Machines, Inc.
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
Producto Machine Co., The
Star Machine & Tool Co.

DIE SECTIONS—Composite Steel
Ajax Steel & Forge Co.
Allegheny Ludlum Steel Corp., Forging & Casting Div.
Firth-Sterling Steel Co.

DIE SETS
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
Producto Machine Co., The

DIE STOCK
Masonite Corporation

DIE STEEL (See STEEL — Tool & Die)

DIE STOPS—Automatic
West, E. C.

DIE SUBSTITUTE MACHINES
O'Neil-Irwin Mfg. Co.

DIES
Alofs Mfg. Co.
Armstrong Bros. Tool Co.
Barth Stamping & Machine Works
Bloomfield Tool Corp.

SHOP AIDS

individual units for planning efficient allocation of available space on factory floor plan.

Sets of these cards are offered without charge by the Plan-O-Mill Corp., Dept. TJ, 1811 E. Eight Mile Rd., Hazel Park, Mich.

INFORM-A-GRAM KEY No. 65-E

THE ART OF ENGRAVING is a very interesting portrayal of one of the highly skilled crafts. This six-page pamphlet issued by the R. A. Koegl Stamp and Die Works, Dept. TD, 480 Washington St., Newark 2, N. J., compares the work of the hand engraver with the work of the Gorton pantograph engraving machine operator, pointing out each has a place in the industry and best results are sometimes obtained by a combination of the two. Having knowledge of the intensive industrial training courses, of six weeks duration, which were in effect in a large number of plants during the war, it is interesting to note that on the average it takes approximately 15 years or more of experience to become a first class hand engraver.

This pamphlet is obtainable by writing to the company, or use our postage free

INFORM-A-GRAM KEY No. F34-E

"CHARACTERISTICS OF REZISTAL STAINLESS STEELS" is presented in folder form by Crucible Steel Company of America. Type Analysis, Physical Properties, Electrical Properties, Heat Treatment, Average Mechanical Properties, Heat Resistance, Hardness, Working, and Type Number are given for 21 alloys by their trade names.

This valuable information is available on request from Crucible Steel Company, Dept. TD, 405 Lexington Ave., New York 17, N. Y.

INFORM-A-GRAM KEY No. 256-E

"HOW TO HANDLE COLLECTIVE NEGOTIATIONS" is a specially prepared report, and is based on an exhaustive survey which was made by the National Foremen's Institute at the request of a client. The material of the report was carefully checked by a panel of labor relations experts and the final draft edited by the Executive's Labor Letter staff.

It points out the errors and fallacies which have tripped management in the past and how to avoid those mistakes in the future.

The report is divided into 17 sections, each dealing with a different phase of negotiating a labor contract.

The book is multigraphed in two colors on rag paper, 9½ x 11½; bound in Multo binder, 42 sheets, priced at $5.00 fob shipping point. Copies are obtainable from National Foremen's Institute, Inc., Deep River, Conn.

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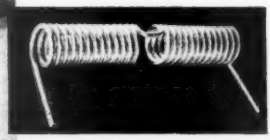

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Variety Machine & Stamping Co.
Viking Tool & Machine Corp., The
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DIES—Carbide
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DIES—Die Casting
Ajax Steel & Forge Co.
Federal Tool Corp.

DIES—Forming
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DIES—Interchangeable
Allied Products Corp.

DIES—Master Washer
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Besly & Co., Charles H.

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Oliver Instrument Co.

DOGS—Lathe & Milling Machine
Armstrong Bros. Tool Co.

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Acme Industrial Co.
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
Producto Machine Co., The

DRAWBARS
General Die & Stamping Co.

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J & S Tool Co.

DRESSERS—Contour
Goleonda Diamond Products Corp.

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Carboloy Co., Inc.
Meyers Co., Inc., W. F.

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Scherr Co., Inc., George

DRESSERS—Wheel
Lee Co., K. O.

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DRILL PRESS (See PRESSES—Drill)

DRILL ROD
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Carpenter Steel Co., The
Darwin & Milner, Inc.
Latrobe Electric Steel Co.

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Rusnok Tool Works

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DRILLING HEADS—Turret
Madco Products, Inc.

DRILLING MACHINES
Sommer & Adams Co., The

DRILLING POSTS
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Builders Iron Foundry

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Goral Tool Co.

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Ex-Cell-O Corp.

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Conner Tool & Cutter Co.

DRILLS—Hardsteel
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Die Supply Co.

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Eastern Tool Supply Co.

DRILLS—Oil Hole
Detroit Reamer & Tool Co.

DRILLS—Ratchet
Armstrong Bros. Tool Co.

DRILLS—Tool-Forged
Republic Drill & Tool Co.

DRILLS—Sensitive
Production Machine Co.

DRILLS—Special
Detroit Reamer & Tool Co.

DRILLS—Twist
Cleveland Twist Drill Co.
National Twist Drill & Tool Co.

DRIVES—Gearshift
Lima Electric Motor Co., The

DRIVES—Motorized
Master Electric Co., Industrial Equipment Div.

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O'Neil-Irwin Mfg. Co.

DUPLICATORS
Detroit Universal Duplicator
Turchan Follower Machine Co.

DUST COLLECTORS
Acme Tool Co.
Standard Electrical Tool Co., The

EDGES—Straight
Acme Tool Co.
Challenge Machinery Co., The
Ford Motor Co., Johansson Div.

ELEVATORS—Portable
Economy Engineering Co.

END MILLS
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Bokum Tool Co.
Gorton Machine Co., George
Putnam Tool Co.
Slewek Tool Div. of Domestic Industries, Inc.
Wesson Products Co.

END MILLS—Special
Detroit Reamer & Tool Co.

ENGINEERING SERVICE
Erickson Steel Co.
McKinney Tool & Mfg. Co., The

ENGRAVING MACHINES
Gorton Machine Co., George
Preis Engraving Machine Co., H. P.

ETCHERS—Acid, Pantographic
Preis Engraving Machine Co., H. P.

ETCHERS—Electric
Acme Tool Co.
Gorton Machine Co., George
Preis Engraving Machine Co., H. P.

ETCHING INK
Dykem Co., The

EXPERIMENTAL WORK
Merz Engineering Co.

FACERS
Clark Co., Robert H.

FEED FINGERS
Hardinge Brothers, Inc.

FEED REGULATOR—Drilling, Milling
Special Devices Co.

FEEDS—Air Operated
Bellows Co., The
Mead Specialties Co.

FEEDS—Die
Covert Manufacturing Co.
Dickerman Mfg. Co., H. E.

FEEDS—Hitch
Dickerman Mfg. Co., H. E.
Die Supply Co.

FILES—Ebonite
Heller Brothers Company

FILES—Rotary
Die Supply Co.
Ford Mfg. Co., Inc., M. A.
Grobet File Co. of America
Hamilton Tool Co., The
Heller Brothers Company
Nicholson File Co.
Severance Tool Industries, Inc.

FILES—Swiss Pattern
Grobet File Co. of America

FILING MACHINES—Continuous
DoAll Company, The

FILING MACHINES—Die
Illinois Tool Works
Milwaukee Chaplet & Mfg. Co.
Oliver Instrument Co.

FILTERS—Air Line
M-B Products

FIXTURES
Bloomfield Tool Corp.
Bone Tool & Gauge Co.
Cleveland Universal Jig Co.
Don Gage Co.
Dressel-Betz Co.
Electrix Corp.
Enterprise Machine Parts Corp., The
Federal Tool Corp.
General Die & Tool Co.
Lorain Machine & Tool Co.
Master Gauge Co.
McKinney Tool & Mfg. Co.
Merz Engineering Co.
Moore Special Tool Co., Inc.
Paramount Tool Co.
Sossner Tap & Tool Co.
Star Machine & Tool Co.
Ulmer Co., The J. C.
Viking Tool & Machine Corp., The
Vinco Corp.

FIXTURES—Broaching (See BROACHING FIXTURES)

FIXTURES—Grinding (See GRINDING FIXTURES)

FLEXIBLE SHAFTS
Precise Products Co.

FLEXIBLE SHAFT MACHINES
Acme Tool Co.

FLOATING HOLDERS
Gairing Tool Co., The

FORGINGS—Steel
Ajax Steel & Forge Co.
Allegheny Ludlum Steel Corp.
Latrobe Electric Steel Co.

FORGINGS—Water & Oil Hardening
Allegheny Ludlum Steel Corp., Forging & Casting Div.

FORMERS—Wheel & Tool
Meyers Co., Inc., W. F.

FORMING TOOLS
Cooper-Bessemer Corp., The
Don Gage Co.
Hardinge Brothers, Inc.
Wesson Products Co.
Wheel Trueing Tool Co.

FORMING TOOLS—Special
Detroit Reamer & Tool Co.

FURNACE HEATING ELEMENTS—Electric
Carborundum Co.

FURNACE REFRACTORIES
Carborundum Co.

FURNACES—Case Hardening
Cooley Electric Mfg. Corp.
Johnson Gas Appliance Co.

FURNACES—Electric Heat Treating
Cooley Electric Mfg. Corp.
Thermo Electric Co.

FURNACES—High Speed Steel
Johnson Gas Appliance Co.

FURNACES—Laboratory
Cooley Electric Mfg. Corp.
Thermo Electric Co.

FURNACES—Melting
Johnson Gas Appliance Co.

FURNACES—Soldering
Johnson Gas Appliance Co.
Yost Mfg. Co.

FURNACES—Tempering & Drawing
Cooley Electric Mfg. Corp.
Johnson Gas Appliance Co.

SHOP AIDS

GRINDING WHEEL CARE is explained and illustrated in a lately released folder by Sterling Grinding Wheel Co. Plant managers and foremen will find this folder a convenient medium of instructing their workers how to prolong the life of grinding wheels and obtain from them the most accurate and dependable performance. Lack of knowledge or negligence on the worker's part causes the most breakage of and accidents due to grinding wheels. Caring for them properly is shown herein by cautions and directions resulting from actual shop occurrences and specific tests to determine the durability of grinding wheels under abusive treatment. Proper ways of handling, moving, testing and using grinding wheels, as well as safety precautions for the worker, are briefly and comprehensively told in simply worded statements.

This folder is available to any foreman, in quantities for passing to his men or single copies will be sent to grinding wheel operators. It is distributed by The Sterling Grinding Wheel Division of The Cleveland Quarries Co., Dept. TD, Tiffin, Ohio, or use our postage free

INFORM-A-GRAM KEY No. 475-E

"ENGINEERING DATA" SUPPLEMENT. For those methods, tool and plant engineers who have in their possession or have been using "Engineering Data" M-1322, published by The Cincinnati Milling Machine Co., will be interested to know this company has issued a supplement to it, No. M-1418. Specifications for the Plain and Duplex Hydromatic Milling Machines, Model OL, are given. The supplement follows the style in make-up as used in the original, and will be included in the next issue of "Engineering Data".

If you now have a copy of "Engineering Data", this supplement will be sent you on request from The Cincinnati Milling Machine Co., Dept. TJ, Cincinnati 9, Ohio.

INFORM-A-GRAM KEY No. 233.5-E

REVERSIBLE THREAD GAGES (Patents applied for) are the subject of Bulletin 945 just issued by the Size Control Co., Div. of the American Machine & Gage Co., Dept. T-9, 4660 W. Fulton St., Chicago, Ill., makers of reversible GO and NO-GO plug gages. The new gage is threaded along its entire length and can be reversed in the handle when worn, and in addition, worn leading edges can be cut off several times, thus multiplying the life of the gage many times. For easier identification by the inspector, polished green GO and red NO-GO gripping nuts are at either end of the polished black handle.

INFORM-A-GRAM KEY No. F40-E

"MOWS 'EM DOWN" . . . in busy **TOOLROOMS**

What do you do when a parade of little jobs comes marching into your shop? Dies, jigs, fixtures, models, metal patterns . . . all needed at once! Must you schedule some of them on large, expensive machines?

Don't do it! Get a Linley and "mow 'em down" fast, accurately, and at low costs . . . saving higher rated machines for their own jobs. The Linley has 8 speeds to 4250 r.p.m., velvet feed, direct micrometer setting, rigidity, strength, compactness.

It's a buy! It's a steady money-maker.

***Bulletin* on request**

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GAGE BLOCKS
Dearborn Gage Co.
Ford Motor Co., Johansson Div.
Scherr Co., Inc., George
Webber Gage Co.

GAGE HANDLES
Federal Tool Corp.
Great Lakes Metal Specialties & Mfg. Co.

GAGE TOOLS
Wheel Trueing Tool Co.

GAGES—Built-Up
Master Gauge Co.
Perfex Gage & Tool Co.
Turner Gauge Grinding Co.
Vinco Corp.

GAGES—Carbide Tipped
Kennametal, Inc.
Tools & Gages, Inc.

GAGES—Center, Depth, Planer, Telescoping, Surface, Thickness, etc.
Don Gage Co.
Lufkin Rule Co.
Tools & Gages, Inc.

GAGES—Concentricity
Master Gauge Co.

GAGES—Contour
Perfex Gage & Tool Co.

GAGES—Cylindrical
Pipe Machinery Co., The

GAGES—Depth
Don Gage Co.
Lassy Tool Co.

GAGES—Dial
Federal Products Corp.
Sun Tool & Gauge Corp.

GAGES—Fixture
Perfex Gage & Tool Co.

GAGES—Flush Pin
Master Gauge Co.
Perfex Gage & Tool Co.
Schnacke Manufacturing Corp.
Turner Gauge Grinding Co.

GAGES—Grinding
Acro Tool & Die Works

GAGES—Height
Dickerman Mfg. Co., H. E.
Don Gage Co.

GAGES—ID & OD
Federal Products Corp.

GAGES—Inspection
Comtor Co., The

GAGES—Internal Indicator Bore
Swedish Gage Co. of America

GAGES—Internal Setting
Dearborn Gage Co.

GAGES—Master Disks
Swedish Gage Co. of America

GAGES—Micrometer Dial
Ames Co., B. C.

GAGES—Multiple Inspection
Federal Products Corp.
Tools & Gages, Inc.

GAGES—Plain Plug & Ring
Acme Industrial Co.
Carboloy Co., Inc.
Elgin National Watch Co.
Master Gauge Co.
Mera Engineering Co.
Perfex Gage & Tool Co.
Pipe Machinery Co., The
Sav-Way Industries
Swedish Gage Co. of America
Tools & Gages, Inc.
Turner Gauge Grinding Co.
Vard, Inc.
Vinco Corp.

GAGES—Precision
American Measuring Instrument Corp.
Bunell Machine & Tool Co.
Gage Co. Division
Pipe Machinery Co., The
Star Machine & Tool Co.
Tools & Gages, Inc.
Turner Gauge Grinding Co.
Woodsworth Co., N. A.

GAGES—Profile
Gage Co. Division
Master Gauge Co.

GAGES—Snap
Master Gauge Co.
Perfex Gage & Tool Co.
Scherr Co., Inc., George
Tools & Gages, Inc.
Tubular Micrometer Co.
Turner Gauge Grinding Co.
Vard, Inc.

GAGES—Special
Acro Tool & Die Works
Barth Stamping & Machine Works
Federal Tool Corp.
Griffin Co., George O.
Lorain Machine & Tool Co., The
Metrical Laboratories, Inc.
Pipe Machinery Co., The
Sun Tool & Gauge Corp.
Swedish Gage Co. of America
Triangle Engineering Co.
Turner Gauge Grinding Co.
Ulmer Co., The J. C.
Vard, Inc.
Viking Tool & Machine Corp., The
Vinco Corp.

GAGES—Telescoping
Brand Tool & Supply Co.
Detroit Tap & Tool Co.
Federal Products Corp.
Mera Engineering Co.
Sossner Tap & Tool Co.
Tools & Gages, Inc.

GAGES—Thread Plug & Ring
Cadillac Gage Co.
Elgin National Watch Co.
Master Gauge Co.
Perfex Gage & Tool Co.
Pipe Machinery Co., The
Vard, Inc.
Vinco Corp.

GAGES—Tool Setting
Bartelt Engineering Co.
Tools & Gages, Inc.

GEAR BOXES
Western Aircraft Tool Co.

GEARS
Hartford Special Machinery Co., The
Taylor Machine Co.

GLOVES—Industrial
Industrial Gloves Co.

GRADUATORS
Gorton Machine Co., George

GRINDER TOOLS
Norton Co.
Clark Co., Robert H.

GRINDERS—Abrasive Band & Disc
Mead Specialties, Inc.
Production Machine Co.
Stuart Industries, Inc.
Walls Sales Corp.

GRINDERS—Attachments
Cincinnati Grinders, Inc.

GRINDERS—Automatic Cycle
Cincinnati Grinders, Inc.

GRINDERS—Bench & Pedestal
Delta Mfg. Co., The
Sanford Mfg. Co.
Standard Electrical Tool Co., The

GRINDERS—Carbide Tool
Delta Mfg. Co., The
Gorton Machine Co., George
Hammond Machinery Builders, Inc.
Lee Co., K. O.
Standard Electrical Tool Co., The

GRINDERS—Centerless & Center Type
Cincinnati Grinders, Inc.

GRINDERS—Chip Breaker
Delta Mfg. Co., The
Lee Co., K. O.

GRINDERS—Combination Twist Drill & Tap
Gallmeyer & Livingston Co.

GRINDERS—Cutter & Tool Attachments
Cincinnati Milling Machine Co.

GRINDERS—Crankshaft
Lempco Products, Inc.

GRINDERS—Cylindrical
Cincinnati Grinders, Inc.
J & S Tool Co.
Norton Co.

GRINDERS—Die
Standard Electrical Tool Co., The

GRINDERS—Disc
Besly & Co., Charles H.
Lempco Products, Inc.
Standard Electrical Tool Co., The

GRINDERS—Engraving Cutter
Preis Engraving Machine Co., H. P.

GRINDERS—External
Standard Electrical Tool Co., The

GRINDERS—Face
Oliver Instrument Co.
Standard Electrical Tool Co., The

GRINDERS—General Purpose
Hammond Machinery Builders, Inc.
Standard Electrical Tool Co., The

GRINDERS—Hand (See GRINDERS—Portable)

GRINDERS—Heavy Duty
Hammond Machinery Builders, Inc.
Standard Electrical Tool Co., The

GRINDERS—Hydraulic
Cincinnati Grinders, Inc.
Gallmeyer & Livingston Co.

GRINDERS—Internal
Abrasive Machine Tool Co.
Lempco Products, Inc.
Rivett Lathe & Grinder, Inc.
Sav-Way Industries
Standard Electrical Tool Co., The

GRINDERS—Plain, Center Type
Cincinnati Grinders, Inc.

GRINDERS—Portable
Chicago Wheel & Mfg. Co.
Dumore Co., The
Foredom Electric Co.
Precise Products Corp.
Standard Electrical Tool Co., The

GRINDERS—Portable Pneumatic
M-B Products

GRINDERS—Precision for Contours
Baker Bros., Inc.
Dumore Co., The

GRINDERS—Profile
Boyar-Schultz Corp.

GRINDERS—Ring Wheel
Besly & Co., Charles H.
Standard Electrical Tool Co., The

GRINDERS—Snagging
Standard Electrical Tool Co., The

GRINDERS—Stationary Pneumatic
M-B Products

GRINDERS—Surface
Abrasive Machine Tool Co.
Builders Iron Foundry
Delta Mfg. Co., The
Gallmeyer & Livingston Co.
Lempco Products, Inc.
Norton Co.
Reid Brothers Co., Inc.
Sanford Mfg. Co.

GRINDERS—Tap
Boggis & Co., Henry P.
Gallmeyer & Livingston Co.
Minn-Kota Foundry & Mfg. Co.

GRINDERS—Tool Bit
Oliver Instrument Co.

GRINDERS—Tool & Cutter
Boyar-Schultz Corp.
Cincinnati Milling Machine Co.
Cleveland Tool Engineering Co., The
Douglas Machinery Co., Inc.
Gorton Machine Co., George
Kearney & Trecker Products Corp.
Norton Co.
Oliver Instrument Co.
Production Machine Co.
Production Machinery Development Co.
Scherr Co., Inc., George

GRINDERS—Tool Post
Lempco Products, Inc.
Standard Electrical Tool Co., The

GRINDERS—Twist Drill
Gallmeyer & Livingston Co.

GRINDERS—Universal
Cincinnati Grinders, Inc.
Norton Co.
Production Machine Co.
Rivett Lathe & Grinder, Inc.

GRINDERS—Universal Tool & Cutter
Cincinnati Milling Machine Co.
Douglas Machinery Co., Inc.
Gallmeyer & Livingston Co.
Lee Co., K. O.

GRINDERS—Utility
M-B Products

GRINDERS—Vertical Spindle
Standard Electrical Tool Co., The
Stuart Industries, Inc.

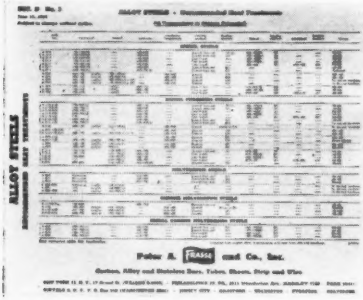
GRINDERS—Wet Tool
Standard Electrical Tool Co., The

GRINDING & LAPPING—Precision
Acme Industrial Co.
J & S Tool Co.

GRINDING (Cylindrical) & POLISHING MACHINES
Hammond Machinery Builders, Inc.

SHOP AIDS

"RECOMMENDED HEAT TREATMENT OF ALLOY STEELS," summarizing proper annealing, normalizing, hardening, reheating and drawing temperatures, with recommended



practice for each alloy analysis has been prepared in chart form by Peter A. Frasse and Co. Standard SAE and AISI grades, including the NE types, are covered.

Data Chart No. D-3 is printed on tough card stock and tabbed for reference filing, or can be inserted in a ring binder for the engineer's handy reference.

For a copy of this chart write Peter A. Frasse & Co., Inc., Dept. 73a, 17 Grand Street at Sixth Avenue, New York 13, N. Y.

INFORM-A-GRAM KEY No. 781-E

MILLING MACHINES & ATTACHMENTS are pictorially described in an 8-page bulletin published by Burke Machine Tool Co., Dept. D, 301 E. 16th St., Conneaut, Ohio. These machines can also be used as Jig Borers, and as no weight has been sacrificed, they will perform any work within their dimensional capacity. All screws have graduated dials, graduated in .001". Motors are mounted low on the column and to the side, which makes them extremely flexible for the changing speeds.

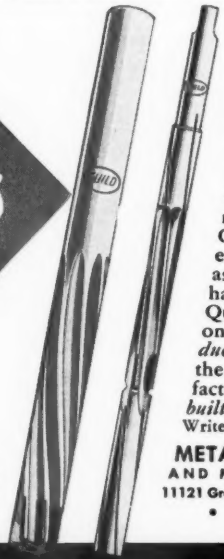
INFORM-A-GRAM KEY No. 661-E

NEW TYPE BORING & MILLING MACHINE which introduces automatic positioning and "accuracy beyond human skill" with unique push button controls is featured in a photographically descriptive 8-page bulletin released by DeVlieg Machine Co., Dept. T-7, 450 Fair Ave., Ferndale, Mich. The Model 3-B JIGMIL performs on light, medium and heavy work, within its dimensional capacity, weighing up to two tons. All bar functions can be performed with the operator's continual visual attention to the cutting tool.

INFORM-A-GRAM KEY No. 574-E

GUILD Reamers

HALLMARK OF Precision IN THE MANUFACTURE OF Special Reamers



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What STERLING is to silver GUILD is to Reamers

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GRINDING WHEELS
Carborundum Co., The
Chicago Wheel & Mfg. Co.
DeSanno & Sons, A. P.
Norton Co.

GUIDE PINS
Danly Machine Specialties, Inc.
Die Supply Co.

HAMMERS—Board Drop
Chambersburg Engineering Co.

HAMMERS—Rawhide
Chicago Rawhide Mfg. Co.

HAMMERS—Replaceable Face
Greene, Tweed & Co.

HAMMERS—Single & Double Frame Forgings
Chambersburg Engineering Co.

HAMMERS—Soft Alloy
Industrial Products Suppliers

HAMMERS—Steam Drop
Chambersburg Engineering Co.

HAMMERS—Steel Inspector
Cunningham Co., M. E.

HANDLES—Gage
Tanzi Engineering Co.

HARD SURFACING
Scully-Jones & Co.

HARDNESS TESTERS
Ames Co., B. C.
Clark Instrument, Inc.
Shore Instrument & Mfg. Co., Inc., The
Wilson Mechanical Instrument Co., Inc.

HEADS — Boring (See **BORING HEADS**)

HEADS—Dividing
Cincinnati Milling Machine Co.

HEADS—Milling
Gorton Machine Co., George

HEAT TREATING
Perfection Tool & Metal Heat Treating Co.

HOBS—Gear Generating
U. S. Machine Tool Mfg. Corp.

HOBS—Hook Checking Machine For
Detroit Tap & Tool Co.

HOBS—Spline
U. S. Machine Tool Mfg. Corp.

HOBS—Thread
Detroit Tap & Tool Co.
U. S. Machine Tool Mfg. Corp.

HOBS—Thread Milling
Pipe Machinery Co., The
U. S. Machine Tool Mfg. Corp.

HOLDERS—Adjustable
Ford Motor Co., Johanssen Div.

HOLDERS—Breach (See **BROACH HOLDERS**)

HOLDERS—Drill
Armstrong Bros. Tool Co.
Rusnok Tool Works

HOLDERS—Steel for Number
Acromark Co., The
Cunningham Co., M. E.

HOLDERS—Tap
Procunier Safety Chuck Co.

HOLDERS—Tool
Acme Tool Co.
Allison Tool & Engraving Co.
Armstrong Bros. Tool Co.
Boyar-Schultz Corp.
Clark Co., Robert H.
Dearborn, Inc., Howard
Gairing Tool Co., The
Wesson Products Co.

HOLDING FIXTURES
Zagar Tool, Inc.

HOLE CUTTERS—Adjustable
Clark Co., Robert H.

HONING—Contract
Enterprise Machine Parts Corp., The

HONING MACHINES—Cylindrical
Automotive Maintenance Machinery Co. (Ammco)

HONING MACHINES—Horizontal
Enterprise Machine Parts Corp., The
Sunnen Products Co.

HOUSINGS—Aluminum Sheet
Conrad & Moser

HYDRAULIC MACHINERY
Denison Engineering Co.
Peerless Machine Co.
Rockford Machine Tool Co.

IDENTIFICATION COLORS
Dykem Co., The

INDEX BASES
Allison Tool & Engineering Co.

INDEXING DEVICES
Hartford Special Machinery Co., The

INDEXING FIXTURES
Zagar Tool, Inc.

INDEXING HEADS—Universal
Cleveland Tool Engineering Co., The

INDICATORS
Lufkin Rule Co.

INDICATORS—Dial
Ames Co., B. C.
Federal Products Corp.
Scherr Co., Inc., George

INDICATORS—Surface Test
Reich Mfg. Co., J. R.

INSPECTION DEVICES
Bartelt Engineering Co.
Edroy Products Co.

IRONS—Angle
Challenge Machinery Co., The

JACKS—Machine
Armstrong Bros. Tool Co.
Enterprise Machine Parts Corp.

JIG BORERS
Cosa Corporation
DeVlieg Machine Co.
Gorton Machine Co., George
Kearney & Trecker Products Corp.
Lorain Machine & Tool Co., The
Moore Special Tool Co., Inc.

JIG GRINDERS
Moore Special Tool Co., Inc.

JIGS
Acro Tool & Die Works
Bloomfield Tool Corp.
Bunell Machine & Tool Co., The
Cleveland Universal Jig Co.
Dressel-Betz Co.
Electrix Corp.
Enterprise Machine Parts Corp., The
Federal Tool Corp.
General Die & Tool Co.
Lorain Machine & Tool Co., The
Master Gauge Co.
McKinney Tool & Mfg. Co., The
Merz Engineering Co.
Moore Special Tool Co., Inc.
National Machine Tool Co.
Paramount Tool Co.
Rockford Die & Tool Works, Inc.
Schraner & Co., A. P.
Siewek Tool Div. of Domestic Industries, Inc.
Star Machine & Tool Co.
Ulmer Co., The J. C.
Viking Tool & Machine Corp., The

KEY SETS
Holo-Krome Screw Corp., The

KEYS—Socket Screw
Die Supply Co.
Holo-Krome Screw Corp., The

KNEES—Toolmakers'
Acme Tool Co.

KNOBS—Hand
Siewek Tool Div. of Domestic Industries, Inc.

KNURLING TOOLS
Armstrong Bros. Tool Co.
Brand Tool & Supply Co.

KNURLS—Steel
Mercury Metal Die & Letter Co.

LAPPING COMPOUNDS
Ace Abrasive Laboratories
Acro Tool & Die Works
Carborundum Co., The

LAPPING—Contract
Acme Industrial Co.

LAPPING MACHINES
Cincinnati Grinders, Inc.
Norton Co.
Schraner & Co., A. P.
Spitfire Tools, Inc.

LAPPING PLATES (See **PLATES—Lapping**)

LAPS
Acro Tool & Die Works
Boyar-Schultz Corp.
Chicago Drillet Corp.

LATHE ACCESSORIES
General Die and Stamping Co.
Master-Taper Co.
South Bend Lathe Works

LATHE CENTERS
Kennametal, Inc.

LATHE CONVERTERS
Master Mfg. Co., The

LATHE DOGS
Armstong Bros. Tool Co.

LATHE STOPS
American Products Co., The

LATHE TOOL CABINETS
Armstrong Bros. Tool Co.

LATHE TOOL POSTS
Armstrong Bros. Tool Co.

LATHE TOOLS
Armstrong Bros. Tool Co.
South Bend Lathe Works

LATHES—Bench
Ames, B. C.
Logan Engineering Co.
Rivett Lathe & Grinder, Inc.
South Bend Lathe Works

LATHES—Magnetic Polishing
Lima Electric Motor Co., The

LATHES—Precision
Ames, B. C.
Hardinge Brothers, Inc.
Logan Engineering Co.
Rivett Lathe & Grinder, Inc.
South Bend Lathe Works
Springfield Machine Tool Co., The

LATHES—Speed
Standard Electrical Tool Co., The

LATHES—Toolroom
Ames, B. C.
Hardinge Brothers, Inc.
Logan Engineering Co.
Rivett Lathe & Grinder, Inc.
Sheldon Machine Co., Inc.
South Bend Lathe Works

LAYOUT FLUID
Die Supply Co.
Dykem Co., The
Michigan Chrome & Chemical Co.
Peninsular Chemical Products Co.

LEADER PINS
Die Supply Co.

LETTERS & FIGURES—Steel
Acromark Co., The
Mercury Metal Die & Letter Co.
New Method Steel Stamps, Inc.

LIFTERS
Cullen-Friestedt Co.
Economy Engineering Co.
Lyon-Raymond Corp.

LIGHTING EQUIPMENT—Industrial
Gorton Machine Co., George
Vimco Mfg. Co.

LOCKS—Fixture
Siewek Tool Div. of Domestic Industries, Inc.

LUBRICANTS
Scientific Lubricants Co.

LUBRICANTS—Gage
Protective Coatings, Inc.

LUBRICATORS
M-B Products
Madison-Kipp Corp.

MACHINE PARTS
Enterprise Machine Parts Corp., The

MACHINERY—Precision
General Engineering & Mfg. Co.

MACHINERY—Special
Lorain Machine & Tool Co., The
Schraner & Co., A. P.
Triangle Engineering Co.

MACHINES—Abrasive
Stuart Industries, Inc.

Price Controls

Increases of eight percent in manufacturers' ceiling prices for drop forgings, metal stampings and screw machine products, in line with the reconversion policy to adjust prices to reflect increased direct material costs and labor rates, have been announced by the OPA.

The increases became effective September 19, 1945, but are applicable to all sales and deliveries made since September 5, 1945.

The increase in prices is provided through issuance of an increase factor of eight percent which manufacturers may use in computing their ceiling prices for drop forgings, metal stampings and screw machine products under the OPA reconversion pricing program.

The manufacturer of drop forgings, to calculate his ceiling price for one of his products, takes his October 1, 1941 price for the item and multiplies it by the increase factor of eight percent. The sum of the resulting figure and his October 1, 1941, price is his reconversion ceiling price.

The manufacturer of metal stampings and screw machine products calculates his reconversion price the same way, except that his base price used in making his computation is his price for the item on the base date of March 31, 1942.

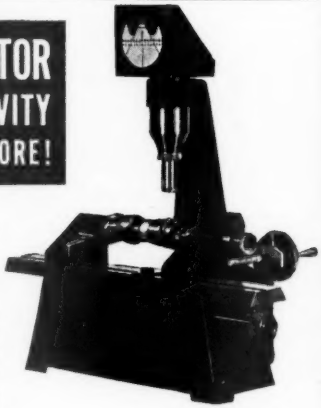
Reference: Amendment No. 11 to Revised Maximum Price Regulation No. 136 "Machines, Parts, and Industrial Services", and Amendment No. 6 to Maximum Price Regulation No. 351, "Ferrous Forgings", both effective September 19, 1945.

ATA

Bibliography of Diamond Tools

A bibliography on "Truing of Grinding Wheels" from 1922 thru 1944; "Diamond as Cutting Tool for Metals and Non-Metallic Materials" from 1900 upwards; and "Diamond Tool Patents" has been published by Diamond Research Dept., The Diamond Trading Co., Ltd., St. Andrews House, 32-34 Holborn Viaduct, London, E. C. 1, England. The publications and patents covered in these three booklets are American, British and German.

New THREAD PICK-UP PROJECTOR
INCREASES GRINDER PRODUCTIVITY
AS MUCH AS 50% . . . SOMETIMES MORE!



- Reduces grinding time
- Wheel and Diamond Life greatly prolonged
- Salvages threaded parts oversize .0003 or more
- Stock removed equally from both flanks
- Beginners can use expertly — quickly

The Thread Pick-up Projector is an optical device for setting the driving dog on pre-threaded work. Allows grinding wheel to enter trough of thread to remove finishing stock from both flanks accurately and without adjustment. Lead is picked up while previous piece is being ground — no time is lost. Viewing screen enlarges thread for quick, accurate check of root depth and angle. Picks up A. N., Acme and Whitworth threads. Operates in conjunction with any thread grinder.

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MAGNIFIERS—Headband
Edroy Products Co.
Zeiss, Inc., Carl

MANDRELS
Lee Co., K. O.

MANDRELS—Expanding
Lee Co., K. O.
Young Arbor Co.

MARKING DEVICES
Acromark Co., The
Cunningham Co., M. E.
Mercury Metal Die & Letter Co.

MARKING INKS—Metal, Plastic
Acromark Co., The
Dykem Co., The

MARKING MACHINES
Acromark Co., The
Gottscho, Inc., Adolph
Preis Engraving Machine Co., H. P.

MASTER TYPE—Marking
Preis Engraving Machine Co., H. P.

METAL—Stresses
Advance Foundry Co., The

MEASURING INSTRUMENTS—Precision
Ames Co., B. C.

MICROMETERS
Brand Tool & Supply Co.
Lufkin Rule Co.
Scherr Co., Inc., George
Tubular Micrometer Co.

MICROMETERS—Inside
Tubular Micrometer Co.

MILLING & JIG BORING MACHINES
Linley Bros. Co.

MILLING MACHINE ARBORS
Cincinnati Milling Machine Co.

MILLING MACHINES—Attachments
Burke Machine Tool Co.
Cincinnati Milling Machine Co.
Gorton Machine Co., George
Kearney & Trecker Products Corp.
Rusnok Tool Works

MILLING MACHINES—Automatic
Cincinnati Milling Machine Co.

MILLING MACHINES—Bench
Ames Co., B. C.
Burke Machine Tool Co.

MILLING MACHINES—Continuous
Sommer & Adams Co., The

MILLING MACHINES—Dial Type
Cincinnati Milling Machine Co.

MILLING MACHINES—Duplex
Cincinnati Milling Machine Co.

MILLING MACHINES—Horizontal
Cincinnati Milling Machine Co.
Douglas Machinery Co., Inc.
Kempsmith Machine Co., The
Lucas & Son, Inc., J. L.

MILLING MACHINES—Hydraulic
Cincinnati Milling Machine Co.

MILLING MACHINES—Meter Driven
Burke Machine Tool Co.

MILLING MACHINES—Multiple Spindle
Cincinnati Milling Machine Co.

MILLING MACHINES—Plain
Kearney & Trecker Products Corp.

MILLING MACHINES—Plain, Universal
Cincinnati Milling Machine Co.
Douglas Machinery Co., Inc.
Kearney & Trecker Products Corp.

MILLING MACHINES—Precision
Hardinge Brothers, Inc.
Kempsmith Machine Co., The
Nichols & Sons, W. H.

MILLING MACHINES—Production
Diamond Machine Tool Co.
Kearney & Trecker Products Corp.
Nichols & Sons, W. H.

MILLING MACHINES—Profile
Cincinnati Milling Machine Co.

MILLING MACHINES—Rail Type
Cincinnati Milling Machine Co.

MILLING MACHINES—Rotary Head
Kearney & Trecker Products Corp.

MILLING MACHINES—Vertical
Cincinnati Milling Machine Co.
Gorton Machine Co., George
Kearney & Trecker Products Corp.
Sommer & Adams Co., The

MILLS—Hollow
Gairing Tool Co., The
Genesee Mfg. Co., Inc.

MITER SAWING MACHINES
Tannewitz Works, The

MOLDING COMPOUNDS
Catalin Corp.
Durez Plastics & Chemicals, Inc.

MOTORS—Electric
Lima Electric Motor Co., The

NAME PLATES—Engraved, Etched, Stamped
Acromark Co., The

NAME PLATES—Plastic
Eastern Etching & Mfg. Co.

NIBBLING MACHINES—Metal
National Machine Tool Co.

NOTCHING EQUIPMENT
Wales-Strippit Corp.

NUMBERING MACHINES
Acromark Co., The
Numberall Stamp & Tool Co.

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Aro Equipment Corp., The

OIL LUBRICATION SYSTEMS—Automatic
Rivett Lathe & Grinder, Inc.

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Park Chemical Co.

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Fish-Schurman Corp.
Scherr Co., Inc., George
Trico Products Corp.

OPTICAL FLATS
Acme Industrial Co.
Scherr Co., Inc., George

OPTICAL MAGNIFIERS
Cargille, B. P.

OVENS—Industrial
Johnson Gas Appliance Co.

PANS—Tote
Lucas & Son, Inc., J. L.

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Magic City Machine Tool Co.

PARALLELS—Magnetic
Scherr Co., Inc. George

PARALLELS—Solid
Challenge Machinery Co.

PARALLELS—Toolmakers
Acro Tool & Die Works
Ford Motor Co., Johansson Div.

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American Photocopy Equipment Co.

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PLASTIC EQUIPMENT
Sav-Way Industries

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PLATES—Angle
Acme Tool Co.
Smith Tool & Engineering Co.
Challenge Machinery Co., The

PLATES—Angle Adjustable (Sine Bar)
Nichols-Morris Corp.
Robbins Engineering Co.
Triangle Engineering Co.

PLATES—Angle, Compound
Angle Computer Co.

PLATES—Bench
Challenge Machinery Co., The
Delta Mfg. Co., The

PLATES—Cold (See COLD PLATES)

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Cadillac Glass Co.

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Die Supply Co.
Holo-Krome Screw Corp., The

POINT THINNER
Oliver Instrument Co.

POINTS
Ford Motor Co., Johansson Div.
Norton Co.

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Hammond Machinery Builders, Inc.
Production Machine Co.
Sommer & Adams Co., The
Standard Electrical Tool Co., The

POLISHING GRAINS & POWDERS
Carborundum Co., The
Norton Co.

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Pine Machinery Co., The

PRECISION PARTS—Hardened Ground
Acme Industrial Co.

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Mead Specialties Co.

PRESSES—Arbor
Lempco Products, Inc.
Wilson, K. H.

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Benchmaster Mfg. Co.

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American Broach Machine Co.

PRESSES—Drill
Baker Bros. Inc.
Delta Mfg. Co., The
Hamilton Tool Co., The

PRESSES—Flanging
Cincinnati Shaper Co., The

PRESSES—Hydraulic
Denison Engineering Co.
Lempco Products, Inc.

PRESSES—Straightening
American Broach & Machine Co.
Denison Engineering Co., The

PRESSES—Utility or Shearing
Producto Machine Co., The

PRODUCTION JOB WORK
Rockford Die & Tool Works, Inc.

PRODUCTION MACHINE REPAIR PARTS
Enterprise Machine Parts Corp., The

PROFILERS
Acme Tool Co.

PROJECTORS
Scherr Co., Inc., George

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Ruthman Machinery Co., The

PUMPS—Circulating
Ruthman Machinery Co., The

PUMPS—Coolant
Ruthman Machinery Co., The

PUMPS—Hydraulic Power
Denison Engineering Co.

PUMPS—Lubricant
Ruthman Machinery Co., The

PUNCHES—Center & Drive Pin
Lufkin Rule Co.

PUNCHES—Interchangeable
Allied Products Corp.
Cincinnati Tool Co., The

PUNCHES—Hand, Toggle Action
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Hardened Copper Nickel Manganese Alloy No. 720

This soft, ductile metal is hot or cold formable for intricate shapes, then hardenable by comparatively low temperature aging. For its dependable, uniform hardening response, No. 720 requires no critically controlled chemical analysis, fabricating technique or heat treatment. When heat treated, this alloy has a high ratio of yield strength and proportionally limited tensile strength. It resists corrosion and has an attractive, silvery color when polished.

No. 720 Alloy's nominal chemical analysis comprises 60% copper, 20% nickel and 20% manganese, all electrolytically produced. It hardens without being held to critical limits and independently of any second phase or compound producing element.

After being fabricated, forged and machined, No. 720 Alloy parts are heated in a temperature range of from 500 to 900 degrees F. Continuous heating for several days causes no appreciable drop in hardness. The wide range of safe hardening temperatures minimizes danger of overaging, a function of temperature.

The alloy's degree of hardness, before its cold working or aging, returns when it is heated to temperatures ranging from 1050 to 1200 degrees F. Water quenching or air cooling may then be employed prior to rehardening by the same aging procedure. Alternate softening and hardening may be endlessly repeated. No. 720's low thermal conductivity and rapid softening at above average temperature, permits the ready softening of hardened elements or increased ductility in local areas.

Elements formed of No. 720 Alloy show negligible distortion during heat treatment. Hardened parts retain configuration and physical dimensions they have had at the hardening temperature. The alloy can be hardened after being silver soldered.

For advice on the application of No. 720 Alloy to your product, send detailed information to the Driver-Harris Co., Dept. Q-17, Harrison, N. J., or use our postage free

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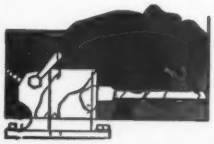

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REAMERS—Ground Flute
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REAMERS—Special
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Lavallee & Ide, Inc.
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REAMERS—Straight
Metal Cutting Tools & Mfg. Co.

REAMERS—Taper Pin
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Durez Plastics & Chemicals, Inc.

RESINS—Castings
Durez Plastics & Chemicals, Inc.

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SAWING MACHINES—Continuous
DoAll Company, The

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Kalamazoo Tank & Silo Co.
Tannewitz Works, The

SAWS—Diamond (See **DIAMOND SAWS**)

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Tannewitz Works, The
Wells Mfg. Corp.

SAWS—General Purpose
Wells Mfg. Corp.

SAWS—Heavy Duty
Wells Mfg. Corp.

SAWS—Hole
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SAWS—Hydraulic
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SAWS—Tool & Die Shop
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Dykem Co., The

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Carpenter Steel Co., The
Columbia Tool Steel Co.
Darwin & Milner, Inc.
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Carpenter Steel Co., The

STEEL—Carbon
Bissett Steel Co., The
Columbia Tool Steel Co.
Darwin & Milner, Inc.
Firth-Sterling Steel Co.

STEEL—Chromium
Carpenter Steel Co., The
Darwin & Milner, Inc.

STEEL—Cobalt
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STEEL—Cold Drawn
Bissett Steel Co., The

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STEEL—Die (See **STEEL—Tool & Die**)

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Latrobe Electric Steel Co.

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Carpenter Steel Co., The
Crucible Steel Co. of America

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Carpenter Steel Co., The

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Crucible Steel Co. of America
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Firth-Sterling Steel Co.

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Carpenter Steel Co., The

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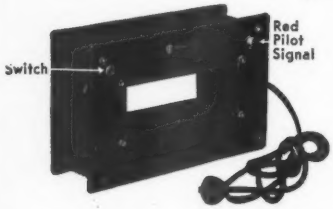

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Crucible Steel Co. of America
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Carpenter Steel Co., The

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SURFACE PLATES—Granite
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Welding Equipment & Supply Co.

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Lyon-Raymond Corp.
Hamilton Tool Co., The

TABLES—Index
Gorton Machine Co., George

TABLES—Rotary
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Gorton Machine Co., George

TABLES—Turn
Challenge Machinery Co., The

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Cooper-Bessemer Corp., The

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Bunell Machine & Tool Co., The
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Firth-Sterling Steel Co.

TOOLS—Special (See SPECIAL TOOLS)

TOOLS—Special Cutting (See CUTTING TOOLS—Special)

TOOLS—Steel Marking
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TOOLS—Turning (See TURNING TOOLS)

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Wheel Trueing Tool Co.

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Minn-Kota Foundry & Mfg. Co.

TORCHES—Soldering
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TUBING—Welded Stainless
Carpenter Steel Co., The

TURNING TOOLS
Wheel Trueing Tool Co.

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TYPE—Steel
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Gottscho, Inc., Adolph
New Method Steel Stamps, Inc.

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Mercury Metal Die & Letter Co.
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Lassy Tool Co.
Lufkin Rule Co.
Scherr Co., Inc., George

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Mead Specialties Co.

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Yost Mfg. Co.

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Bay State Tool & Machine Co.
Gorton Machine Co., George
Ideal Tool & Die Co., Inc.
Producto Machine Co., The
Wesson Products Co.
Yost Mfg. Co.

VISES—Air
Bellows Co., The
Cardinal Machine Co.
Mead Specialties Co.

VISES—Bench
Acme Tool Co.
Yost Mfg. Co.

VISES—Drill Press
National Machine Tool Co.
Thomas Hoist Co.
Yost Mfg. Co.

VISES—Machine
Cincinnati Milling Machine Co.
Gorton Machine Co., George
Producto Machine Co., The

VISES—Pipe
Yost Mfg. Co.

VISES—Milling Machine
Acme Tool Co.
Globe Products Mfg. Co.
Gorton Machine Co., George
Hartford Special Machinery Co., The

VISES—Precision
Vinco Corp.

VISES—Universal
Wesson Products Co.

VISES—Woodworkers' & Patternmakers'
Yost Mfg. Co.

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WELDERS—Arc
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Welding Equipment & Supply Co.

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WELDING RODS
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WHEELS—Abrasive
Besly & Co., Charles H.

WHEELS—Cutting Off
Carborundum Co., The

WHEELS—Diamond (See DIAMOND WHEELS)

WHEELS—Mounted
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Carborundum Co., The
Chicago Wheel & Mfg. Co.

WHEELS—Sanding
Sand-O-Flex Corp.

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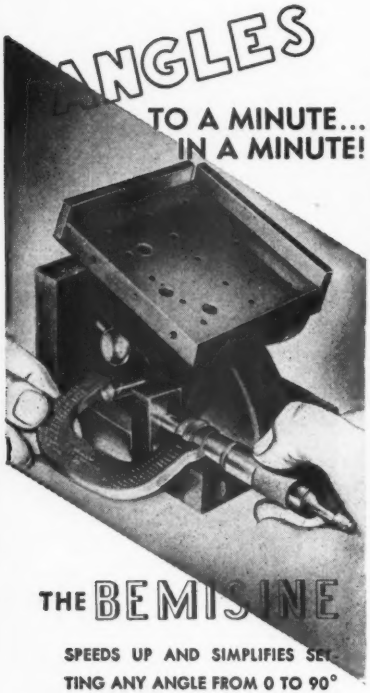
WRENCH SETS
Armstrong Bros. Tool Co.

WRENCHES
Armstrong Bros. Tool Co.

WRENCHES—Reversible Ratchet
Greene, Tweed & Co.



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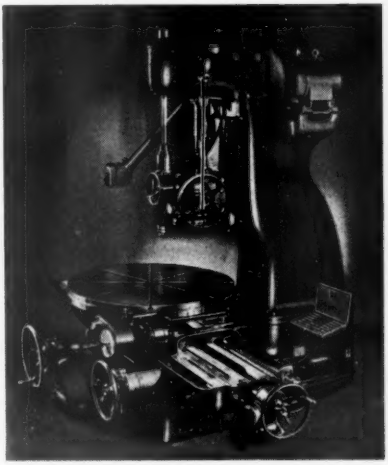
Replacing the regular, plain rectangular table, a new, large, non-detachable precision rotary table is being built into the P&W No. 3B Jig Borer, their largest model. This facilitates precision boring to polar coordinates on large work besides regular rectangular coordinate work, either of which can be handled without change of machine setup. The table may be of 42" or 48" diameter, finished to tolerances such as those held on all Pratt & Whitney Jig Borers. Accuracy is maintained on average work by a precision worm gear indexing mechanism. For still closer accuracy, a spacing system may be provided in the outer rim. If it clears the column ways the largest work outside diameter is 71". Work fitting in the gap below the column ways, under 14⅛" above the table top, can have a maximum outside work diameter of 89". Between table top and spindle nose, the standard distance of 24⅛" may be increased by using raising blocks under the column. Besides handling large jigs, fixtures and tools, No. 3B will do precision milling within jig borer limitation. Details are available from Pratt & Whitney, Division Niles-Bement-Pond Co., Dept. TD, West Hartford 1, Conn., or use our postage free



INFORM-A-GRAM KEY No. 430.5-E

write for Discounts and Bulletin No. 451

Grobet

TWIN FLUTED COUNTERSINKS

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5000 SHAPES and SIZES GROBET Swiss Files

Ask for Catalog YF

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss Files. Ask also for catalog YM on files for filing machines.

Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability—since 1812.

GROBET FILE CO. OF AMERICA, 421 Canal St., New York 13, N. Y.

HEAVY DUTY ADJUSTABLE PERFORATING DIES for perforating materials up to and including ¼" thick mild steel are featured in a photographically descriptive Catalog, No. 45A, published by S. B. WHISTLER & SONS, INC., Dept. TD, 752-756 Military Rd., Buffalo 17, N. Y. Whistler Heavy Duty Adjustable Perforating Dies in standard sizes from ⅛" to 1½" punch diameters in round, oval, square and rectangular shapes are illustrated and priced. These Dies work on practically any type press and a few typical setups are illustrated.

INFORM-A-GRAM KEY No. 88-E

MADISON-KIPP LUBRICATOR, Model FD, is explained in bulletin L-3610, published by MADISON-KIPP CORPORATION, Dept. T-8, Madison 4, Wis. Model FD Lubricator is available in sizes ranging from 4 feeds to over 100 and is designed for most moderate pressure services up to 100 lbs. A single group unit consists of one metering and pumping unit and one rotor distributor assembly with an 8-outlet rotor body. The number of outlets may be reduced to 7 or less to as low as 4 feeds. Each outlet group has an oil delivery adjustment range of from 1 to 10 drops pm. Either rotary or reciprocating drives are available in the FD Lubricator at either end, either side, or the bottom. Bulletin L-3610 thoroughly describes every feature of the Model FD Lubricator.

INFORM-A-GRAM KEY No. B86-E

Step Up Your Vision

7, 20 or even 40 TIMES!

With the Highly Efficient Cargille Master Magnifier Set No. 45

Shows clearly minute details invisible to unaided eyes.

Photomicrograph shows effect seen through the 40-power unit. Note scale. Each interval is 0.001" on object viewed.

Once used, these optical tools will be indispensable. For use on surfaces and details not measurable by other means.

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The following "Economy Factors" make the Milwaukee Die Filer a real "Cost Cutter" for Tool, Die and Machine Shops, Foundries and Manufacturing Plants:

- Low First Cost
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- Precision workmanship on filing, sawing or lapping operations.

Write for Illustrated Bulletin

$125.00 F. O. B. Milwaukee — **COMPLETE with MOTOR and SAW ATTACHMENT**

$118.50 without Saw Overarm. For machines without motor, deduct $8.50 from these prices.

Manufactured by

Milwaukee CHAPLET & MANUFACTURING CO.

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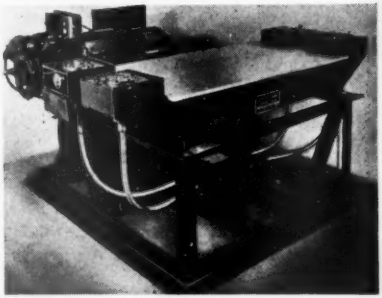
Vibration Test Table

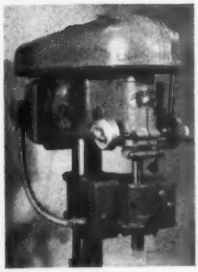
Tests for endurance can now be applied to shake out faults in assemblies and components before they are shipped or used. Relative vibratory displacements can be seen when viewed with a stroboscope. The simple, rugged and scientifically engineered testing equipment is a Vibration Test Table. The 24" x 40¾" top is supported by four vertical rod flexing columns which provide



for free table vibration in two horizontal directions. Rectilinear and pure harmonic vibrations are induced by the rotation of eccentric weights in four sets, mounted on vertical shafts and driven through a synchronizing gear box and flexible shafts. The amplitude, ⅛" maximum excursion at a 100 lb table load, and the direction of vibration, either horizontal, crosswise or lengthwise, are adjustable when the machine is idle. A load increased over 100 lbs automatically reduces the amplitude. The standard frequency range, 10 to 60 cycles per second, is adjustable during operation. This is accomplished either by hand or wheel or by ¼ hp motor-driven automatic frequency change control with one minute complete cycle. The amplitude does not vary with frequency. An acceleration of 10Gs is produced at 40 cycles per second at ⅛" double amplitude. The equipment's capacity is 400 lbs, weight 1500 lbs, and its overall dimensions are 52" x 58" x 32" high. It is installed without concrete base floors and is operated by a 5 hp motor. Further information is available from the makers, L. A. B. Corp., Dept. TD, Summit, N. J., or use our postage free

INFORM-A-GRAM KEY No. F10-E

LEAD SCREW TAPPING



ON YOUR OWN DRILL PRESS!

With this ROTOREX tapping head you can convert your drill press to a precision tapping machine and consistently produce Class III threads. Rotorex employs a precision ground lead screw for tapping leads. To change back to drilling, swing Rotorex to one side.

$175.00
F. O. B. FACTORY

- Positive, automatic control of lead.
- Hardened precision ground lead screws.
- Instantaneous emergency reverse.
- Complete automatic cycle.
- Accurate control of depth—to .010.
- Foot control frees hands for loading.
- Capacity 0-80 to ⅜".

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DOUGLAS MACHINERY CO., INC. 150 BROADWAY, NEW YORK 7, N. Y.

Infinite Positions

WITH NEW Self Adjusting PEC JIG CLAMPS

No OTHER CLAMP is as flexible in its applications...in closed position, the clamping bar has infinite adjustment up to 15° below and above horizontal. Because of the exclusive PEC self-adjusting feature it is possible to carry a much smaller stock, as one PEC will do the work of many ordinary non-adjustable jig clamps.

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Self-Adjusting, Quick-Acting, Infinite Positions, Drop Forged, Positive Lock

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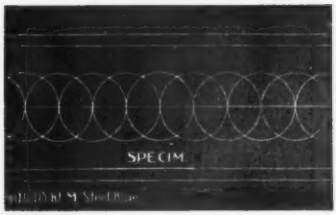
9045 WILSHIRE BLVD. • BEVERLY HILLS, CALIF.



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Simply brush on, ready for the layout in a few minutes. The dark blue background makes the layout lines show up in a sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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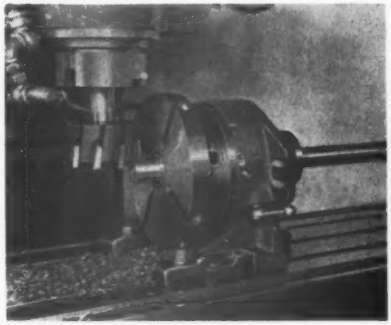

HARTFORD SUPER-SPACER

The adaptability of the Super-Spacer is illustrated here in milling bar stock. It is mounted with a draw-in collet and face plate combination. Many shops use their Super-Spacers to reduce or eliminate tricky setups and special fixtures. Many applications on a variety of operations are shown in Bulletin No. S-101.

THE HARTFORD SPECIAL MACHINERY CO.

TOOLROOM
VERSATILITY

Easily set up attachments make this GREENFIELD No. 4 Tool & Cutter Grinder an invaluable production and toolroom machine for grinding formed cutters, taper and rose reamers, and compound angles, as well as straight surface work. Heavy, rigid construction, adjustable table, generous bearing areas, attachments for cylindrical and internal grinding.
Write for bulletin No. 2 for further details.

PRODUCTION MACHINE COMPANY
GREENFIELD, MASS.

HY-TEN
AISI SAE

ALLOY STEELS FOR RECONVERSION

To take advantage of up-to-the-minute development in the metallurgy of steel before improvements can be incorporated in the natural course of events in standard steels, specify HY-TEN STEELS.
Immediate shipment from seven conveniently located stocks.
Data sheets gladly mailed on request.
"THE HY-TEN OF TODAY IS THE STANDARD STEEL OF TOMORROW."

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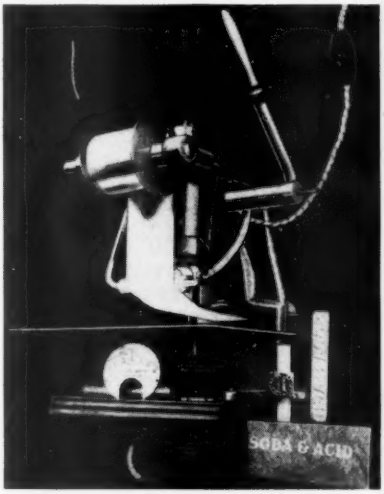
Marking Plastics

Even hard molded plastics are efficiently and attractively color marked by use of the specially engraved, extra deep die installed in the Acromark No. 10, one of a series of such machines. Its basic design is incorporated in machines of adequate sizes for handling extremely large, complicated plastic parts. The Acromark No. 10, with dials, name



plates, flat parts, plates, and metal dies for hot stamping them, are all shown herewith. An electric heating element, powered through an ordinary light socket, heats the die or interchangeable type holder which applies the impression to the part. Color is supplied by a strip of transfer tape being automatically fed through the machine between the die and part and advancing with each die stroke. The tape is available in any standard pigment, silver, and gold metallic colors. The Acromark No. 10 marks a wide variety of plastic parts at speed of from 30 to 50 pieces pm, if they handle easily. The average production rate is about 25 pieces pm. No. 10 is produced by the Acromark Co., Dept. TJ, 5-15 Morrell St., Elizabeth 4, N. J. For further information use our postage free

INFORM-A-GRAM KEY No. 636-E

and now . . . when savings in man-hours still are important in production costs. . . . .

Write for bulletin

PORTELVATOR *Portable Elevating Table*

To carry or lift parts, tools, dies and other items; as work bench; for overhanging work . . . to save man-power for more important operations.

THE HAMILTON TOOL CO.
HAMILTON, OHIO

FS TM REG

DIAMOND IMPREGNATED

HONES

(Sintered Steel Bonded)

The life of carbide tools can be prolonged by lengthening the interval between regrinds. And this can be accomplished by touching up such tools lightly with FS Diamond Hones.

FS Diamond Hones are also recommended for shaping special contours on carbide form tools, where diamond grinding wheels do not suffice.

Hone is 6" long overall—diamond section being 1¼" x ½". For best results a 325-400 grit is recommended, and FS Diamond Hones are so stocked. Other grits from 100 to 600 also available.

Write for further particulars.

FISH-SCHURMAN CORPORATION
230 East 45th Street, New York 17, N. Y.
Fish-Schurman

CUT THE CUTS

WITH A

DUAL-SPIRAL REAMER

Just ONE CUT is necessary to finish-ream any machinable metal with this remarkable reamer. The flutes of 3 blades spiral in opposed directions shearing an abrasive-free, satin-smooth finish. Blades can be resharpened 8 to 10 times and when worn out can be replaced in 30 seconds. Ideal too for reaming over slots, keyways and split bushings.

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EVANS REAMER AND MACHINE CO.

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Established 1918

SCHMIDT SOLDERING and OPEN FLAME TORCHES

Use artificial or natural gas or gasoline. Start without generating—"soldering heat in less than a minute." Schmidt "CONCEALED FLAME" Soldering Torches hold coppers steadily at any desired heat for continuous work. Very economical.

A moderate investment in Schmidt Equipment will step up production, reduce costs and increase profits. Send for circular.

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VERNIER CALIPERS

Quick-Action Caliper for use in

Workshop—Inspection—Automotive Repair

Permits accurate measurements of external and internal dimensions. Knife-edged jaws accommodate thread measurements and a depth gage blade, depth measurements. Made in Stainless Steel or Toolsteel. Each caliper packed in a leatherette cover.

AMIC Precision Vernier Calipers: 6", 10", 24"
AMIC Precision Vernier Height Gages: 10", 18", 24"
Depth Gages — Pocket Calipers

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NOW! ONE DIE TABLE for

✓ LIFTING
✓ MOVING
✓ SEPARATING
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DIES UP TO 3000 lbs.!

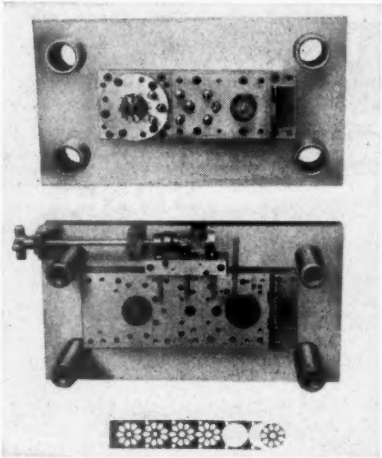
● The BARRETT MULTI-DUTY DIE TABLE makes die handling a safe, easy one-man job. It's a cost-saver, too, a lifting table, work bench, hoist, and floor truck—all in one!

All-steel, welded construction . . . heavy-duty ball bearing wheels . . . gears fully enclosed. Available with 28"x44" or 24"x36" tables. For free and complete details, write

BARRETT-CRAVENS COMPANY
3269 W. 30th St., Chicago 23, Ill.
Representatives in All Principal Cities
Canadian Licensee: S. A. Armstrong Ltd., Toronto

Carbide Lamination Die

Producing 500,000 laminations without even a foreseen need of resharpening, in stamping rotor laminations, is the record of the carbide lamination (progressive) die. In this procedure it primarily supplants the high speed steel die, which formerly produced 35,000 laminations between resharpenings. The die and pilot pins of solid carbide are used for the complete operation cycle. This consists of punching 9 teeth, 4 pilot holes, a combination shaft and key-



seat opening, and cutting off from silicon steel stock .014" thick x 1⅝" wide. The high speed steel die, in punching 500,000 parts, would need at least 14 resharpenings, thereby causing 14 press idle periods. Thus the saving of time and labor besides increasing of production effected by use of the carbide die over-compensates for its original cost, four or five times more than high speed steel. To date, the carbide die has completely eliminated press down time, as well as need for stand-by dies, while producing laminations that are flat, with no burrs, cost less and partly comprise a superior motor. The carbide lamination die is a product of The New England Carbide Tool Co., Dept. TD, 60 Brookline St., Cambridge 39, Mass. Further details are available through use of our postage free

INFORM-A-GRAM KEY No. 58-E

"STAR DUST"

LABORATORY GRADED

PURE DIAMOND POWDERS

STAR DUST speeds up production enormously and produces finishes and superfinishes down to less than .00000004 of an inch.

Precision LAPPING POWDERS for PRECISION work

For GAUGES, TOOLS, DIES, etc., with tremendous TIME SAVING. These fasters make STAR DUST indispensable in lapping and superfinishing on HARDSTEELS, TUNGSTEN CARBIDE, CHROME.

- Absolute control of particle sizes
- Complete absence of out-size particles
- STAR DUST sizes as fine as .0001"
- Complete range of grit sizes

There is a STAR DUST Field Serviceman in your territory.

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VICTORY LOAN

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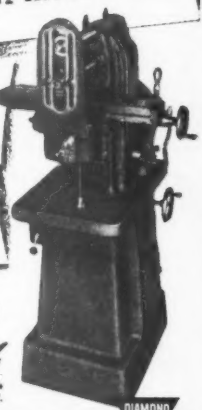
MODEL M-26 Diamond

PRECISION 1½ H.P. MILLER

DEPENDABLE PRODUCTION with economy of investment

IMMEDIATE DELIVERY! NO PRIORITY



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Diamond MACHINE TOOL CO.

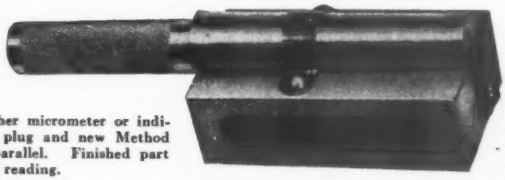
3430 E. OLYMPIC BLVD., LOS ANGELES 23, CALIF.

Manufacturers of the DIAMOND Line of Premium Milling Machines and Accessories

DIAMOND

THE NEW METHOD TAPER GAUGE

All standard sizes; Morse, B & S - Jarno. *Specials on request*

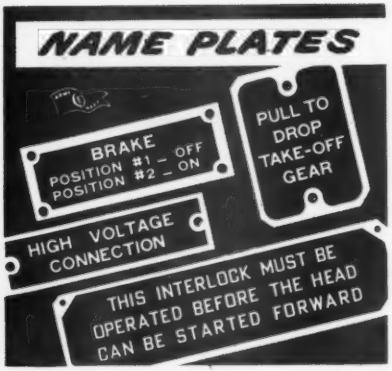


Check Tapers EASILY QUICKLY ACCURATELY

No sine bar No figuring

Your reading (either micrometer or indicator) over taper plug and new Method Taper Gauge is parallel. Finished part should be the same reading.

JOSEPH B. FAKES & COMPANY 1415 Etowah Ave. Royal Oak, Michigan


NAME PLATES
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PULL TO DROP TAKE-OFF GEAR
HIGH VOLTAGE CONNECTION
THIS INTERLOCK MUST BE OPERATED BEFORE THE HEAD CAN BE STARTED FORWARD

Modern Messengers in

ETCHED METAL OR PLASTIC

Name plates, dials, scales, panels. Eastern Etching's prompt deliveries help aid in your reconversion. Normal deliveries — Two Weeks. Tool checks, data and instruction plates, dials, scales, instrument panels, etched and lithographed products. ***For complete details write—***

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Drop Forged Carbon and Chrome-Vanadium open end and box socket wrenches, and Chrome-Vanadium Steel Detachable Sockets with drop forged Ratchets—over 100 types, all sizes.

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ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

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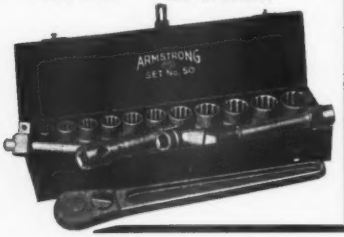
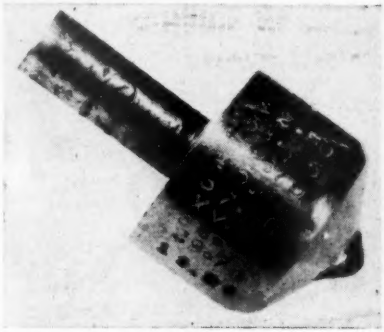
New York San Francisco



Largest Diamond Tool

62.5 CARAT DIAMOND. Illustrated, is what is believed to be the largest diamond dresser in the world, owned by Sheldon M. Booth, president of the Diamond Tool Co. It was supplied Oct. 18, 1940, to the Northwestern Engineering Co., Green Bay, Wis., for use on a large U. S. Navy contract. This diamond tool is used on a 24" dia, 3" face, Norton crank-shaft grinder (401N27 Carborundum Wheel). The diamond, which is



Common quality, weighed 62.5 carats. It was placed in a Diamond Tool Co. patented Loc-Key-Set Re-Set-Able setting, which permits many quick re-settings without damage and results consequently in the longest and most complete utilization of the diamond and lowest priced service on its original cost. The diamond, which has been re-set seven times by the Diamond Tool Co., now weighs 19.2 carats.

Copy of purchase order from the Northwest Engineering Co. for the seventh re-setting on Feb. 22, 1945, after 4½ years of constant service, shows that at the sixth re-setting the diamond weighed 29.75 carats. It has since yielded 8,065 dressings with a loss in weight of only 10.55 carats.

The dimension across the tool head is 1⅜" dia and the shank $\frac{7}{16}$". The proper angle for setting the diamond tool is 12° to 15° with the point of the diamond just below the horizontal center.

Literature containing valuable information is available from the Diamond Tool Co., 938 East 41st St., Chicago 15, Ill., or use our postage free

INFORM-A-GRAM KEY No. 633-E

A True Precision Indicator

THE REICH 3-WAY

Price Includes Indicator, Adjustable Mounting Arm and Universal Holder. Special Contact Points Available.

SURFACE TEST INDICATOR . .

. . . small (2½ inches) . . . compact, practical and sturdily constructed. Can be read from EITHER side, or the end. Readings, in white, on a black background, are easily visible. Pointer is bright red. Scale graduated in thousandths of an inch, with non-magnetic movement range of .014. The MOST PRACTICAL and ACCURATE (in either direction) Indicator of its kind. ORDER NOW!

$5 *complete (plus postage)*

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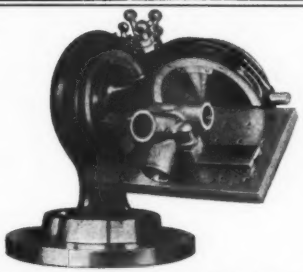
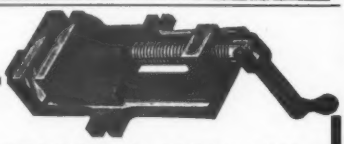


Computes Angles QUICKLY

The Studler Angle Computer so simplifies layout of die work, survey of castings, and inspection of precision-machined parts that users report it is doing the work in one-half to one-tenth of the time required by the sine bar method. Only one set-up is required. The work shown above was accurately surveyed in 15 minutes.

THE ANGLE COMPUTER CO.
(Dept. TDJ-11)
1709 Standard Ave., Glendale 1, Calif.

STUDLER
ANGLE COMPUTER



YOST DRILL PRESS VISE

This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12¼
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY
1000 MAIN ST.
MEADVILLE, PENNSYLVANIA

DUPLEX M-6
BAND AND DISC GRINDER

The latest in pedestal type grinders. Actually two machines in one! 14″ disc for all rough work . . . 6 x 48″ band for finishing. Precision-built to meet postwar production standards—quickly, economically!

Other styles and sizes in New Booklet on Finishing—Write Today

WALLS SALES CORP.
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HELP PREVENT AN ACCIDENT TODAY!

SAFETY
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WEDGE GRIP
LETTERS & FIGURES

- No Spalling!
- No Mushrooming!

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- For tough stamping jobs.
- Deeper impression with less exertion.
- Any size character from 1/16" to 1".

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SAFETY STEEL STAMPS
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NUMBERALL

IMPROVED TYPE HOLDERS
for stamping into Metal, etc.

Hand or Press style. Type can be easily, quickly loaded and unloaded. Simplest construction . . . Just a sturdy pin holds the type securely. No screws nor springs. Super-quality steel type made in various sizes: 1/32" up to 1/2" figures and letters.

Write for Bulletin TD23H

STEEL TYPE

We also make numbering machines, automatic or non-automatic for stamping numbers and letters into metal

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

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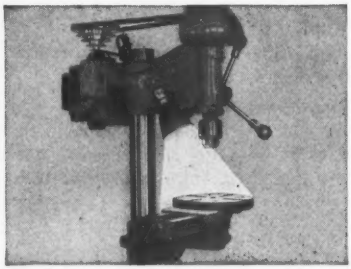

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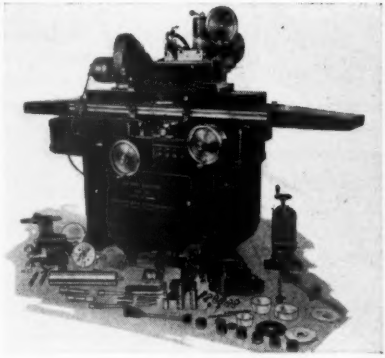

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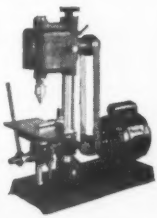

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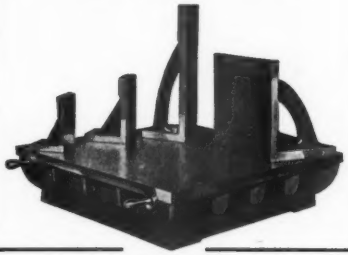

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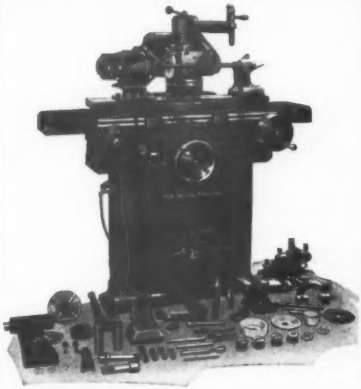

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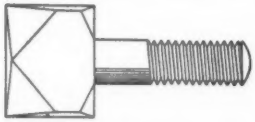

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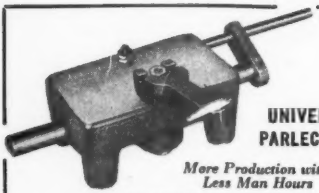

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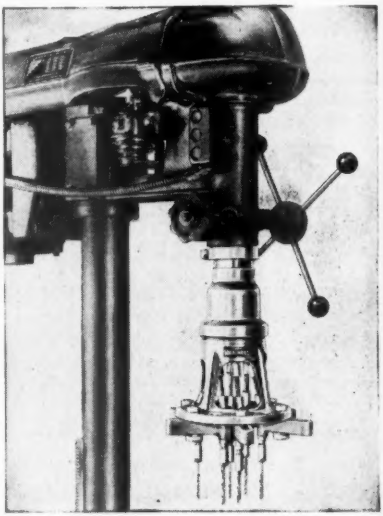
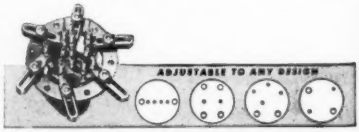


able spindles, each of which is located by an individual radially adjustable aim. This design permits the positioning of drills up to 17/64" dia in any hole pattern, including a straight line, within a 5" dia circle with minimum distances between centers of 11/16". From one to



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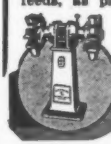

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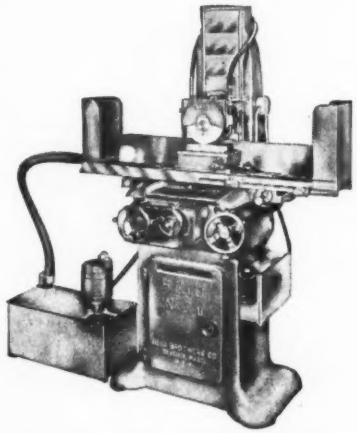

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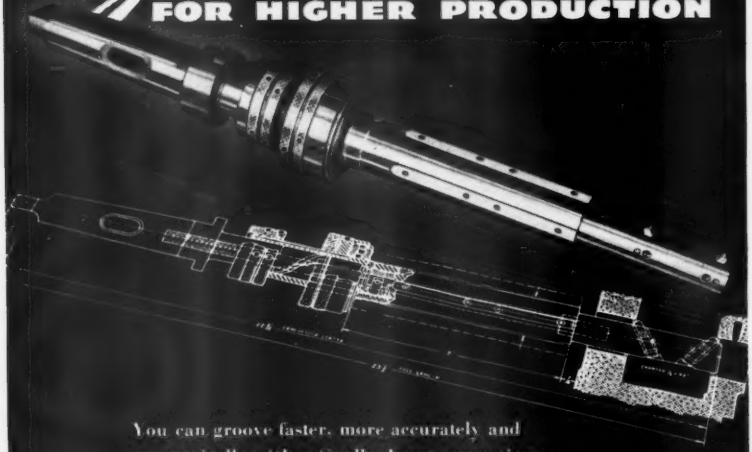

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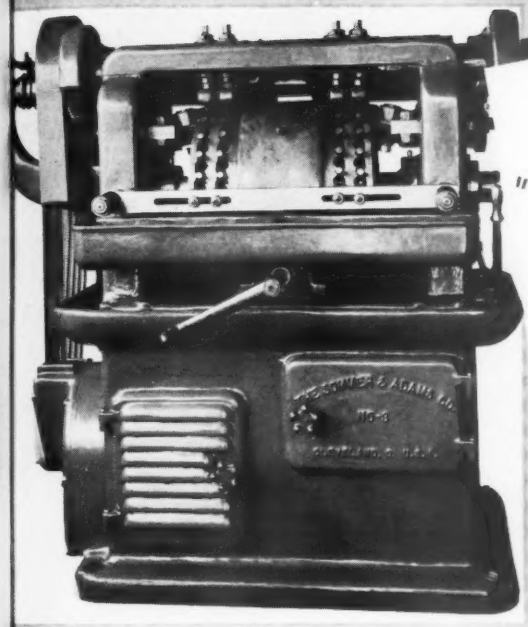

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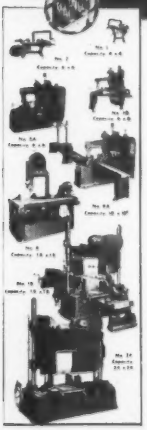

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